

## **Appendix A, Subpart 4: Response to Comments**

### Evans to Sugg 011408

1. What will happen to the ecology of our plants and live “critters” if we straighten the New River Inlet?

**Response: Refer to Section 5 of the FEIS**

### Irv Henry to Sugg 012008

1. I have read several reports/studies that indicate major erosion did not occur until USACE cut the New River Inlet main ocean bar channel in NTB to allow better access for the local shrimping industry.

**Response: Maintenance of the ocean bar channel through New River Inlet was initiated in 1964 by the Corps of Engineers. Dredging begins in the inlet gorge, i.e., the deepest portion of the channel located between North Topsail Beach and Onslow Beach and extends across the ebb tide delta. No attempt is made to maintain a fixed channel alignment; rather the dredges follow the naturally deep channel that exists at the time of the maintenance operation. Between 1964 and 1984, the shoreline on the north end of North Topsail Beach accreted at a rate of 6.1 feet/year (Figure 37 in the Engineering Report – EIS appendix B). During that period, the ocean bar channel was oriented toward the southwest or toward North Topsail Beach. Erosion of the north end began around 1984 and corresponded to a shift in the alignment of the ocean bar channel toward Onslow Beach. Based on the history of maintenance dredging and changes in the shoreline on the north end of North Topsail Beach, there is no correlation between the erosion and dredging in New River Inlet. Rather, the behavior of the north end of North Topsail Beach is associated with changes in the position and orientation of the ocean bar channel of New River Inlet.**

2. Why place such a financial burden on the little town of NTB?

**Response: This question is beyond the scope of the FEIS. This is an issue to address with the Town’s Board of Aldermen.**

### Shoffner to Sugg

1. I understand that the sand that is removed will be discolored and still look forward to it being added to our island.

**Response: The wet and dry Munsell colors found on the native beach were compared by CPE geologists to the material identified in the Inlet borrow area and the offshore borrow area. The results of the comparison indicate that the color of the potential fill material is similar to the material currently found on the beach. The hue indicates only slight variations in the amount of red and yellow between the native and fill material. The native beach and fill chromas are within**

the same range; with the exception of two samples found in the Inlet borrow area. The fill material value is, on average, within one shade of the value of the native beach. Refer to Section 5.2 of the FEIS for additional information.

Yawn to Sugg

1. There are a number of offshore hard bottom areas in the offshore sand borrow area. There has been some discussion of allowing sand to be harvested closer to these hard bottom areas than currently allowed. I urge you to NOT allow the reduction of that distance.

**Response: A 400 foot buffer has been established between dredging operations and hardbottom resources. For additional avoidance and minimization measures related to hardbottom resources, refer to Section 6.1 and 6.4.7 of the FEIS.**

2. I have concerns that widening, deepening, and straightening the New River Inlet channel could result in significant upstream salt water migration. I am worried that plant and animal life that depend on brackish or fresh water may be harmed or destroyed with this influx of salt water. I urge you to look at this carefully as the New River is somewhat unique in that it is very wide but also very short. I am very concerned that the freshwater ecosystems of the river may be harmed or destroyed.

**Response: Potential changes in flow volumes and flow patterns through New River Inlet for various modifications of the inlet ocean bar channel are reported in the section entitled "HYDRODYNAMIC MODEL" in the Engineering Report (Appendix B) of the FEIS. All other factors being equal, the volume of water passing through a tidal inlet is controlled primarily by the cross-sectional area of the inlet throat, i.e., the narrowest portion of the inlet lying between the adjacent islands. The channel modification proposed for New River Inlet would begin seaward of the inlet throat and extend across the ocean bar or ebb tide delta. Therefore, the cross-sectional area of the inlet throat would not be changed and the channel modification should have no impact on the volume of water flowing through the inlet.**

The model results for flows through New River Inlet for the three channel alternatives evaluated are provided in Table 7 of the Engineering Report (Appendix B of the EIS). The three channel alternatives consisted of channel widths of 300 feet, 400 feet, and 500 feet. The model results indicate no significant change in the total volume of water entering or leaving New River Inlet compared to the existing condition. Also, the model did not show any significant difference in the flow distribution through the connecting channels and over the bordering marsh areas. Again, since the inlet throat would not be altered as a result of the relocation of the ebb tide delta channel, the model results support the controlling influence the throat cross-sectional area has on the tidal exchange through the inlet.

3. The draft EIS states that the town has a "Preferred Alternative" for this project. Yet the only group that can speak as proxy for the town and our "Preferred Alternative" is our Board of Aldermen. Only they can make such a statement. The draft EIS should have been submitted to our Board of Aldermen for approval before it was put out for public comment and certainly before permits are granted.

**Response: The EIS process includes the utilization of a "Preferred Alternative" determined by the applicant.**

4. As I am sure you are aware, 80% of the voters voted down a bond issue on Beach Nourishment in November 2006. Right now there is no funding mechanism that has been approved by the voters or by our Board of Aldermen for this project.

**Response: This question is beyond the scope of work of this FEIS.**

5. Finally, I am concerned that some areas of the beach get significantly more sand than others in this plan. For example, phase 4 gets about 145 cubic feet per linear foot, but stage 5 only gets about 25.

**Response: The engineered design calls for certain areas to receive more material than others due to project goals and needs. Refer to Appendix B (Engineering Report) for additional information.**

Walsh to Sugg 012908

1. This project is a small, short term attempt to save properties most threatened by erosion. It is a proposal that pumps sand from "borrow sites" which are far too fragile and close to hard ocean bottom areas that, if used, could pose grave consequences to the island and the inlet. Even if the borrow site were a safe distance, "sand pumping" is merely a short term fix at best! The reason the term "borrow area" is used is because that sand is "BORROWED" and will wash right back again.

**Response: Refer to Section 6.4.7 of the FEIS for additional information regarding avoidance and minimization measures to impacts related to hardbottom resources. Appendix B (Engineering Report) discusses the anticipated lifespan of the nourishment project.**

2. The proponents... do not discuss "retreat" as a viable beach nourishment option, but, conversely, stand up in support for changing CAMA laws that will allow building closer to the shoreline after pumping sand. What happens when new structures are placed on nourished beaches?

**Response: CAMA regulations require the establishment of a "static vegetation" line for all beaches that have a large-scale beach nourishment project where a large-scale beach nourishment project is defined as one equal to or greater than 300,000 cubic yards. The beach receiving the major beach nourishment is**

required to survey the location of the seaward most line of stable natural vegetation prior to the initiation of the beach nourishment project. Following the placement of the fill, the static vegetation is then used to determine setbacks for ocean front structures. Revisions to the static vegetation line rule are now in effect which allows beach communities subjected to the static vegetation line to apply for an exception. In order to obtain the exception, the project must have been maintained for a minimum of 5 years and the community must be able to demonstrate it has the financial resources and an identified borrow source that will support the project for 25 years. If the static line exception is approved by the Coastal Resources Commission, ocean front structures with a floor space of 2,500 square feet or less may be constructed on a lot provided it meets the minimum setback requirement measured from the existing seaward most line of stable natural vegetation of 30 time the annual erosion rate or 60 feet which ever is greater.

Mueller (EPA) to Pulliam 022208

1. This Draft EIS discounts the increasing difficulties of dealing with barrier island development and the burdensome costs and difficulties to fend off ocean advances. More damaging storms are predicted along with the rise in sea level. We therefore suggest additional consideration of the two no-build alternatives.

**Response:** The impacts of historic rates of rise in sea level are implicitly included in the historic shoreline change data used to formulate the shoreline and inlet management plan for North Topsail Beach. The historic rate of rise in sea level applicable to the project area is 1.25 feet per century. Some projections suggest the rate of sea level rise could double within the next 50 to 100 years however since only a portion of the observed shoreline change rates are associated with sea level rise, doubling the rate of shoreline change associated with sea level.

In the section of the Engineering Report entitled “EXISTING SEDIMENT BUDGET” the historic rate of rise in sea level was estimated to cause about 0.5 foot of shoreline recession per year. With measured rates of shoreline change ranging from 2 to 5 feet per year, sea level rise has very little impact on shoreline change.

Perhaps a good example of how sea level rise may or may not affect the performance of a beach nourishment project, one only need to look at the performance of the Wrightsville Beach and Carolina Beach federal storm damage reduction projects. Both of these project have been in existence since 1965 (44 years) and have been subjected to the same rate of sea level rise applicable to North Topsail Beach. A review of the nourishment rates for these two project shows no significant change in the volume or frequency of periodic nourishment needed to maintain the projects.

With regard to increased storm frequency and/or intensity due to climate change, there are diverse opinions as to whether or not this impact may occur. Even so, the comparison of the abandon/retreat option for North Topsail Beach indicates

**total the town's development, infrastructure, and tourist based economy would suffer greatly under this alternative.**

2. The potential adverse impacts to migratory fish and invertebrates by the inlet repositioning, deepening, and additional dredging every four years (or probably more frequently), are not fully documented, and could have substantial negative ramifications to the overall fishery.

**Response: Refer to Section 5 of the FEIS for environmental consequences related to Alternative 3.**

3. The proposed relocation of the channel is contrary to the natural trends in coastal processes over time to orient the channel as it presently exists. Given that the net sand transport historically has been southerly, EPA would suggest that the best way to naturally replenish North Topsail Beach is to minimize interruption of long-shore sand dynamics. Digging a much deeper and wider channel as proposed with Alternative 3 is likely to become a sand conduit seaward.

**Response: Most tidal inlets like New River Inlet are notoriously inefficient in moving sand from one side to the other. Based on historic surveys and dredging records for New River Inlet and the Cedar Bush Cut, the channel connecting New River Inlet to the Atlantic Intracoastal Waterway, the New River Inlet complex has trapped 130,000 cubic yards of littoral sediment per year. This rate of entrapment, which essentially is equal to the estimated volumetric loss rate along the northern 7.25 miles of North Topsail Beach, is approximately 16% of the gross annual littoral sand transport in the area. The proposed project for North Topsail Beach involves an inlet sand management component which would artificially transfer sediment from the new channel to the northern 7.25 miles of North Topsail Beach. The inlet sand management component would reduce permanent sand retention in New River Inlet by 38% and would assure a steady and predictable supply of sediment from the inlet to North Topsail Beach.**

4. Beginning on page 33, the Town's preferred Alternative 3 is described as a five phased action over a 9 year construction period. There is reference, here, to a "recovery period" estimated to be 15 years for the preferred alternative to restore the shoreline to a baseline location and beach size. However, the Draft EIS does not present any logical way that this baseline was established previously. Barrier island beaches have been shifting continually so it is uncertain whether a baseline location and contour of the shoreline should be defined. EPA contends that there never has been any static baseline location because the barrier island beach configuration changes constantly. Further, the term "recovery period" would normally refer to environmental condition which is not the case here with recurrent deposition of more sand onto the beach.

**Response: The predicted fifteen (15) year recovery period for the extreme north end of North Topsail Beach following the relocation and re-alignment of the ocean bar channel of New River Inlet was based on a reversal of the erosion trend**

**observed between 1984 and 1999 following the shift of the channel toward Onslow Beach in 1984. There was no discussion of a baseline condition, only the restoration of the shoreline to a condition comparable to that which existed in 1984 when the channel was oriented toward North Topsail Beach.**

5. Table 5 on page 3 indicates that a total of approximately 3.22 million cubic yards (mcy) of fill material is required for all 5 phases of Alternative 3, but the text on previous pages states a quantity of 7.19 mcy would be needed. Different fill volumes are mentioned for the same alternative and the volumes vary between alternatives with the same borrow site without appropriate clarification.

**Response: The total volume of material that would be placed on North Topsail Beach during the 5 phases is 4,094,800 cubic yards. Of this total, 2,296,400 cubic yards would be obtained from the offshore borrow area, 544,400 cubic yards would be derived from the initial construction of the new channel in New River Inlet, and 1,254,000 cubic yards would be associated with maintenance of the new channel. Initial construction of the new channel would also entail the disposal of 91,400 cubic yards of incompatible material in an upland disposal site located near the juncture of Cedar Bush Cut and the Atlantic Intracoastal Waterway. The final EIS will be revised and any inconsistencies in the dredging volumes corrected.**

6. The realignment of the New River Inlet channel should consider whether the repositioned, channel with a depth of 18 feet and width of 500 feet would be more efficient to maintain and more stable than the present alignment. EPA contends that unless there is a great deal of certainty of this being more efficient and less costly for the maintenance of navigation requirements in the long term, it should not be contemplated. A more north-south channel orientation proposed and is said to be consistent with old baseline conditions. However, where the expected effects of a one time dredging and relocated channel for Alternative 5 are discussed on page 167, it is revealed that this alignment is not expected to be more self-maintaining and would possibly need more frequent dredging. Inlet configuration is predicted to revert to the present alignment over some (unspecified) time period. It would seem that the engineering difficulties and costs could escalate along with environmental impacts, without any long-term navigation benefits.

**Response: The channel realignment is designed to effect changes in the shoreline condition on the extreme north end of North Topsail Beach not improve the navigability of the inlet. The channel is predicted to shoal and possible migrate out of the preferred channel corridor; hence, two channel maintenance thresholds are included. The first threshold is based on the channel entrapping 85% of the initial dredge volume while the second threshold would trigger maintenance once the channel thalweg (deepest portion of the channel) migrates out of the preferred channel corridor**

7. Seven alternatives are considered in the DEIS including No Action. Because of the lengthy duration of the activities, it is unclear whether the Corps has latitude in its authorizations or permitting of the project. EPA is concerned that this is an all or nothing approval of the project rather than a provision for interim mid-course review at an appropriate juncture.

**Response: It is anticipated that the record of decision as determined by the USACE will include result in an appropriate permit including relevant permit conditions.**

8. The No Action Alternative and the Buy-Out/Relocation Alternative involve no dredging and filling other than for the normal channel maintenance. The financial impacts to the Town from the loss of tax revenue and the value of the habitation of beachfront structures are presented. These alternatives have not been developed in any degree of detail nor assessed relative to the ultimate alternative uses of the abandoned property restored to its natural state, and the absence of the municipal infrastructure expenses needed to support the residential properties.

**Response: Refer to Section 3 for additional information regarding the economics of Alternatives 1 and 2.**

9. Other than four alternatives that would require different borrow and placement of fill, Alternative 7 is the construction of a terminal groin on the north end of North Topsail. This alternative was discarded because it is inconsistent with the State's coastal policies. Unfortunately, the Corps did not consider other more innovative structural options that might be found suitable. These might include temporary subaqueous structures or wave baffles to modify the hydrodynamics and sand movement, or methods to lessen the wave energy at the eroded beach areas. The Draft EIS overall is more of a justification for selecting Alternative 3 rather than a comparative evaluation of a full range of potentially feasible alternatives.

**Response: Hardened structures, including terminal groins, are currently illegal within the State of North Carolina; therefore these structures were not evaluated in great detail. Section 5 includes a comprehensive discussion of environmental impacts for each alternative, therefore the document does not simply justify the selection of Alternative 3.**

10. It is noted on page 10 of the document that this project does not focus on improving navigation. EPA infers from this text that the only reason for including inlet reconfiguration (widening and deepening) is for the supply of sand to nourish the North Topsail Beach.

**Response: The rationale for the inlet reconfiguration is to stabilize a migrating inlet currently causing erosion problems on North Topsail Beach.**

11. The document stresses the point that there are 31 residential structures imminently threatened to be lost to inundation, and 10 more past that point. High dollar values have been assigned to the properties in jeopardy or that have already experienced damage and made uninhabitable by coastal erosion. It may not be legitimate for the Town to assign a tax rate corresponding to those high values and have those values reflected in the EIS when the properties would logically be valued much less presently, because of their vulnerable location and the uncertainty of rescue. The effects of sea level rise and the effects of recurring and more severe storm events, the Town is likely to demand more frequent and aggressive beach filling. It is unclear whether repetitive emergencies have been factored into the long-term cost estimates.

**Response: The economic evaluations were prepared to allow relative comparisons between the cost associated with doing nothing to protect the town's development and infrastructure versus the cost of adding fill along the town's shoreline. The plan includes maintenance of the New River Inlet bar channel with disposal of the channel maintenance material along North Topsail Beach to maintain the condition of the beach fill. In the past, the town has relied on emergency responses including beach scraping to rebuild dunes to hauling material to the beach from inland borrow areas to repair storm damages to the beach. With the project in place, the need for this type of emergency response should be reduced.**

12. Discussion of the geology of the barrier islands and nearshore bottoms is found in Section 4.1 .I. Onslow Beach is to the northeast and it experiences localized erosion rates as much as 26 feet/year, which is the most severe erosion documented in the Draft EIS. This could represent a compelling need for Onslow Beach, which is Federal property, to receive priority for remedial action, but the document does not mention any planned or proposed actions.

**Response: The goal of this FEIS is to address the erosion problem on the north end of North Topsail Beach.**

13. Reference is made to the report: "Engineering Analysis Shoreline Protection Project" October 2007, prepared by Coastal Planning & Engineering, Inc. The data presented in Figure 36 indicate substantially greater erosion along Onslow Beach. Further, the trend is that of increasing rate of beach loss. EPA suggests investigation of whether remedial action on Onslow Beach would offer a long-term benefit to North Topsail Beach. Onslow appears to provide better habitat quality than does North Topsail.

**Response: The U.S. Marine Corps, which controls Onslow Beach, was a participant in the Project Delivery Team process and is fully aware of the potential impacts of the project on Onslow Beach. During the initial stages of the plan formulation process the plan included the placement of mitigation beach fill on the southern end of Onslow Beach to counter the predicted impacts. However, the Marine Corps was not in favor of nourishing Onslow Beach as that activity**



**was deemed to potentially have a negative impact on piping plover habitat, namely, an overwash area located on the south end of the island.**

14. It is noted on page 66 of the Engineering Analysis that current sea level rise is 0.0125 Wy-r and it results in beach recession of 0.5 Wy-r at North Topsail Beach. This factor has been considered in the calculations for the proposed project but this factor, like others, is not static and the rate of sea level rise is likely to change over time. Please clarify whether this change will be considered in the future. The effect of sea level rise should be prominently addressed in the final EIS.

**Response: See response to Mueller (EPA) to Pulliam 022208 comment 1 above. The impacts related to sea level rise has been incorporated into the Biological Assessment, Cumulative Effects Assessment, and Section 5 of the FEIS.**

15. Surveys of the nearshore area discussed in this section have documented substantial hard bottom outcrops, and landward facing scarps up to 15 feet high. Regardless of how these features came to be exposed, they and the marine life associated with them are a significant attribute to the nearshore marine environment, and worthy of protection. We note the sidescan survey to determine the existence of hard bottom substrate appears to have been limited to approximately 2,000 ft. seaward from shore. Have all possible sand borrow areas been explored? Also, since surveys conducted in 2006 revealed minimal hard bottom located in the southern section of the study area, why is this area not considered for sand borrow sites?

**Response: Side scan surveys were conducted close to shore as well as offshore in areas that appeared to provide potential sources of beach nourishment material. Also, prior to conducting detailed geotechnical investigations in the proposed offshore borrow area, an extensive review was made of existing geotechnical information available for the area from the Corps of Engineers and the University of North Carolina at Wilmington. The selected borrow site proved to contain beach compatible material of sufficient quantity to support the project. Also, the identified borrow source lies outside areas preliminary identified by the Corps of Engineers for the federal storm damage reduction project being evaluated for the southern end of North Topsail Beach and the town of Surf City which lies south of North Topsail Beach. Through the coordination with state and federal marine fishers and other resource agencies, a plan was developed to use the proposed offshore borrow area that would eliminate potential negative impacts on the offshore hardbottom resources. In addition to providing a 400-foot buffer around potential hardbottom resources near the borrow area, a detailed pre- and post-construction monitoring plan has been included to document impacts on these valuable resources and determine if post-project mitigation is required.**

16. In Section 4.14.3, littoral sand drift and net sand transport are mentioned but data and discussion are presented only in the appended engineering study. Littoral sand

transport and wave action are very important physical factors for this project and merit substantial discussion, here and in regard to the efficacy of the alternatives. It is unclear how wave data obtained from a data buoy offshore in 72 feet water depth provides meaningful data for determining littoral zone and near beach sand transport.

**Response:** The wave information provided for WIS Station AU2044 was used to compute the average longshore sediment transport potential in the vicinity of New River Inlet and along the ocean shoreline of North Topsail Beach for each year between 1976 and 1995. Details of the sediment transport estimates, including average monthly sediment transport rates, are provided in Appendix B – Engineering Report.

The computation of potential sediment transport rates using wave hindcast information reported in Appendix B followed the methodology outlined in the U.S. Army Corps of Engineers Coastal Engineering Manual, EM 1110-2-1100 (Part III) 30 Apr 02, Chapter 2, Longshore Sediment Transport. The wave information reported for the WIS Hindcast Station is transformed from the water depth at the wave information site (72 feet in this case) to shallow water using Snell's Law and conservation of wave energy flux. Snell's Law is given as:

$$\frac{\sin \alpha_b}{C_b} = \frac{\sin \alpha_1}{C_1}$$

Where:  $\alpha_1$  = Wave angle relative to the shoreline in the water depth at the WIS hindcast station

$\alpha_2$  = Wave angle relative to the shoreline near the point of breaking

$C_1$  = Wave Celerity in the water depth at the WIS hindcast station

$C_2$  = Wave Celerity near the point of breaking =  $(gd_b)^{1/2}$

$d_b$  = Water depth at point of breaking

Using the breaker angle determined from the application of Snell's Law, the potential longshore sediment transport associated with each wave condition is computed by the following equation:

$$Q = 7500(.00996)\rho g^2 T(H_{s1})^2 (\sin \alpha_2) (\cos \alpha_1) (3 \text{ hrs./t})$$

Where: Q = Potential longshore sediment transport rate (cy/yr)

$\rho$  = mass density of seawater (1.99 slugs/ft<sup>3</sup>)

g = acceleration due to gravity (32.2 ft/sec<sup>2</sup>)

T = wave period in seconds for the 3-hr hindcast

$H_{s1}$  = Significant wave height for the 3-hr hindcast

$\alpha_1$  = angle between wave crest and shoreline in at the WIS station

$\alpha_2$  = angle between wave crest and shoreline near the break point

t = number of hours in a year

17. Text narrative is quite unclear regarding the placement of fill material. Proximity of the fill relative to the mean low waterline and the landward edge of the hard bottom

outcrop is confusing. EPA suggests the inclusion of beach profile figures of before and after filling. Making this particularly confusing is the modeling conducted to predict the movement of deposited fill subsequent to actual placement using the terms of point of intercept (depth of closure) neither of which are explained adequately. It appears, though, that the immediate or result after time would be fill getting to within 800 feet of hardbottom areas, a distance which is far short of the State-mandated 1,640 ft buffer, and this 800 feet setback may not be sufficiently protective of this resource. In Section 6.4.6 of the document, there is a proposal to lessen the hardbottom buffer further to 400 ft, which may be necessary within the northern section inlet area in order to construct the beach as preferred by the Town. This proposal is inappropriate, in EPA's opinion, for consideration as mitigation or minimization. The sediments and other conditions of Florida's nearshore waters, as referenced here, are considerably different and experience there may not be adequate rationale for lessening the hardbottom buffer for this project.

**Response: Due to the inclusion of avoidance and minimization measures, the approved buffer between the hardbottom resources and the borrow area is 400 feet. See Section 6.4.7 for more information regarding these measures.**

18. The presence of the defined significant natural heritage area named the New River Inlet Outcrop is shown on Figure 8b but a characterization and explanation of its significance could not be found in the EIS. Other hard bottom areas have been located but there is no comparison with the designated outcrop. This information should be provided in the final EIS. Further, the potential impacts of project fill deposition to this outcrop should be stated in the final EIS.

**Response: The extent of all the hardbottom resources found within the project area is described in Section 4.3.4.2. Potential impacts to these resources are described within Section 5.3.4.3.1 and 5.3.4.3.2.**

19. It is interesting to note that annual maintenance dredging is done within New River Inlet and its approaches. For an approximate annual average cost of \$900,000, the result is marginal MLW navigation depths. Does the Corps know what the controlling depth would be without this maintenance? This annual dredging exacts a toll on the shoaling area infaunal habitat and on transitory estuarine-dependant species foraging in this area.

**Response: In the absence of maintenance dredging, controlling depths over the outer edge of the ebb tide delta of New River Inlet would likely vary between 2 and 4 feet below MLW depending on antecedent tide and wave conditions.**

20. Table 20 is a compilation of physical effects from the alternatives on North Topsail and Onslow Beaches. This table is extremely misleading and confusing. One example is that the No Action Alternative does not cause loss of intertidal zone rather this zone shifts in position. Also, it is unclear how habitat losses on Onslow Beach can be attributed to an alternative when the alternative does not involve any action on Onslow.

The habitat loss is actually the natural erosive effects occurring at this time for the barrier island. Additionally, the table shows two entries for impacts to High Marsh habitat, and the numbers do not agree.

**Response: The referenced habitat loss in the question above is indeed a result of the natural erosive effects and is documented as such. The table has been modified to reflect additional comments. Refer to Table 21 for additional impacts related to each alternative and each resource.**

21. Alternative 5 would conduct the beach nourishment of the central section as the other build alternatives, but would conduct a one-time only dredging relocation of the inlet with fill placed onto the north section of the island. Text on page 195 indicates that this alternative "... does not meet the Town's intent to avoid and minimize impacts to natural resources." It is unclear why the other beach nourishment alternatives, likewise, were not found incompatible with this objective.

**Response: This statement has been removed from the FEIS.**

22. A major concern to EPA is raised on page 196 relative to Alternative 6, which would only realign the inlet channel and place that fill onto the beach. The concern pertains to all dredging alternatives and is a potentially major cumulative impact if infaunal diversity and abundance do not recover between dredging actions. There is no further discussion of the recovery of species, and with the frequency of dredging and renourishment so uncertain, we suggest additional focus on this concern in the final EIS, supported by technical references.

**Response: This discussion is included in Section 5.3.3.2 and 5.3.3.3 of the FEIS.**

23. Water turbidity and poor visibility by divers surveying nearshore bottom habitats was documented at times to be 0-30cm during 2006. If turbidity data exist for these surveys, it should be presented with the expected concentrations associated with proposed dredging operations and compared to state water quality standards.

**Response: These anecdotal reports of visibility were recorded *in situ* by divers during a discrete time period. These observations were not part of an extensive turbidity monitoring program.**

24. Not addressed in the document is the potential shoreline erosion along Cedar Bush Cut resulting from this project. Deepening of the inlet channel could create greater water velocities through this marsh area. Mitigation for possible scouring needs to be considered, and further some possible enhancements to the habitat should be considered for this area.

**Response: The tidal prism is not anticipated to increase in a significant manner, therefore the water velocity is not anticipated to increase and cause additional**

**erosion along Cedar Bush Cut. Refer to Appendix B (Engineering Report) for additional information.**

25. Our review of the "Environmental Consequences" chapter and specifically Section 5.10 did not reveal any projection of the results, i.e., the indirect impacts of the project on future development. This is a major omission of the Draft EIS. It is likely that the project would result in intensified development and redevelopment within the FEMA high velocity wind and high flood hazard zones, and demand for supporting infrastructure will increase because of the constructed sand barrier. Also, there is no assessment of the impacts to the island segments covered by the Coastal Barrier Resources Act. This assessment should address whether adjacent new development could diminish the natural resource values of these undeveloped segments. While Onslow County's land use planning is mentioned, there is no description of the extent of development within CBRA segments. Based on some aerial photography, much of the CBRA segments currently have structures on them, and EPA assumes more could be built, but without Federal assistance. EPA suggests that the final EIS provide more information about the impact on CBRA segments.

**Response: The vast majority of the areas within the CBRA system along North Topsail Beach have been developed without federal assistance or federal flood insurance. Therefore, the inclusion of these areas in the CBRA has had little to no impact on the rate and/or density of development. Even following the devastating impacts of Hurricane Fran in 1996 and Floyd in 1999, development within the CBRA zone continues.**

**Obviously, the development occurring within portions of the CBRA system are at high risk as demonstrated by the analysis of storm damage potential provided in the Engineering Report (Appendix B) of the EIS. Since continued development within the CBRA unit will continue without benefit of federal assistance, the non-federal effort to lower storm damage risk would not have any impact on the CBRA unit.**

26. A concept defined as the equilibrium beach profile (perched beach fill is another term used) is proposed involving steeper beach slopes and sub-aqueous deposition of fill. While these designs are proposed to hopefully retard subsequent loss of sand, this section of the document does not explain how this benefits wildlife. EPA suggests that such deviations from normal slopes may result in adverse impacts to wildlife. A goal of the project is to place larger particle sand in areas to lessen accelerated loss and if possible strive to make the new beach fill as close as possible to the indigenous sand grain composition. Again, the objective of the project is to retard sand loss rather than to maintain established grain size composition. It is unclear how deliberate changes in sand particle size may affect wildlife populations and their use of the beach and littoral zone. The most pronounced concern is inhibiting the nesting of loggerhead turtles and shorebirds especially the piping plover.

**Response: Sections 5.3.4.3 and 5.3.4.4 describe the benefits of this perched beach design to the hardbottom resources. The beach fill material will abide by the State Sediment Criteria rules as described in Section 5.3.3.2.**

27. The construction schedule is discussed on page 264 with construction proposed to occur between November 16 and March 31. Considerable interagency effort has resulted in this construction window based on the best data available in order to avoid and minimize impacts to nesting and migration activity. EPA is aware, however, of the recent difficulty experienced by the Corps in contracting other dredging work during winter months due to stormy sea conditions.

**Response: Noted.**

28. Another concern about protected species is potential impact to shore birds particularly the endangered piping plover. It is important for projects like these to have various environmental enhancement components. There is documented visitation by piping plovers but no recent nesting. Therefore we recommend coordination with the Fish and Wildlife Service and state officials regarding a goal of establishing nesting of this listed species on the project beach.

**Response: A bird monitoring program has been established as part of this project. Please refer to Section 6.4.1.1 for more information.**

29. Because of the dynamic nature of this barrier island environment, the impact predictions and need of beach fill have less reliability 15 years or more into the future. It would be appropriate to define a much shorter duration of the Section 404 permit to enable a reevaluation of the performance of the permit holder, and issuance of a new permit and conditions, as appropriate. Also, the extensive monitoring plan proposes pre-construction and post construction documentation of the project. It is unclear whether each separate dredging and filling event would be monitored closely.

**Response: The monitoring program is described in detail in Section 6.4.**

30. There is no description of the borrow site after dredging actions. We recommend adding a post-construction sampling of the borrow site to document the resulting bottom contours, water quality and rate and composition of biological re-colonization. The functional recovery of the sand borrow site is important. Extremely low dissolved oxygen levels can occur as fine particulate organic matter accumulates in depressions on the sea bottom.

**Response: It has been well established that the infaunal communities disturbed by dredging activities recolonize borrow areas within the order of several months and long term impacts are not anticipated. See Section 5.3.3.3 for more information regarding these resources.**

31. The project would have substantial impacts on the coastal resources, and it may have potentially much greater impact in a cumulative sense. There is a very general

cumulative impacts assessment appended, but it does not address encouragement of new development or redevelopment resulting from the project, and there is no reference or summary of the assessment within the main text of the Draft EIS. Additionally, if this project is conducted concurrently or in close succession with similar projects between Wilmington and Beaufort, migratory fish and birds could be impacted, and adverse impact to beach nesting species could be greatly magnified. There is no information provided with which to make any assessment of this potential situation. It is within the prerogative of the Corps to avoid and minimize such cumulative impacts via the permit conditions.

**Response: Table 21 in Section 5 provides a summary of anticipated impacts as a result of each evaluated alternative. Furthermore, Appendix F (Cumulative Effects Assessment) includes a detailed assessment of cumulative effects anticipated with the development of the preferred alternative.**

Hogue (USFWS) to Pulliam 020608

1. We believe the Final EIS for this project should incorporate the latest information on global sea level rise and the role of rising sea level as a threat to structures on the island. There should also be a discussion of the natural adjustments of barrier islands to rising sea level. Such information should play an important role in the development and evaluation of alternatives.

**Response: Section 5, Appendix F and the Biological Assessment include discussions regarding the impacts associated with sea level rise.**

2. There are some sediment characteristics not covered by the State standards such as mineral composition, color, and organic content. There is a possibility that material different in these qualities or material from sizable pockets of silt and/or mud could be placed on the beach.

**Response: This project will abide by the State Sediment Criteria. For additional information regarding sediment compatibility, see Section 5.2 and section 6.1.1.**

3. If beach construction is ultimately undertaken, there should be a plan to monitor the quality of the fill material as it is placed on the beach. There should be an effective procedure for stopping operations if inappropriate material is being pumped onto the beach.

**Response: See Section 6.1 and 6.2 for these construction monitoring practices.**

4. If incompatible material is placed on the beach, there should be a plan for removing such material.

There should be a specified procedure for inspecting the placement site to evaluate whether the material meets the compatibility requirements. If the material does not meet the minimum standards, it should be removed prior to the start of the next sea turtle

nesting season. These conservation measures should be included as conditions for any DA permit.

**Response: Monitoring during construction will ensure that only compatible material is placed on the beach. Should incompatible material be pumped onto the beach, it will be removed. See Section 6 for more information regarding this issue.**

5. To address long-term impacts on the important beach invertebrate community, we recommend a population monitoring program to detect trends in the abundance of important species in this community.

**Response: As mentioned above, these impacts are widely documented and only short-term impacts would be anticipated as these resources are known to repopulate within several months following beach fill activities. See Section 5.3.3.3 for more information regarding these resources.**

6. Any DA permit should contain conditions to protect existing fish and shorebird habitats in the project area.

**Response: Noted. Section 6 includes several monitoring plans which are designed to assess impacts to these resources.**

7. The Department is concerned that the applicant preferred alternative, including the maintenance component, would remove a portion of the marine intertidal and subtidal shoaling habitats which may cause a long-term direct impact due to a reduction in area of these habitats (CPE 2007, p. 174). Removing ocean bottoms can alter natural sand movement and wave patterns striking the coast. Both flood and ebb tide shoals at an inlet can serve as important reservoirs of sand for beaches along the coast. Sand is constantly added and removed for these areas by natural ocean currents. Large sand removals from these areas create sand "sinks" which hold sand which would naturally move along the coast to downdraft beaches. Sediment removals from these areas could increase the rate of shoreline recession on adjacent beaches. The Engineering Analysis discusses the effect of channel orientation on adjacent beaches (CPE 2007, Appendix B, pp. 55-57). However, this discussion considers primarily the effect of the position of the inlet channel and does not consider the long-term impacts of periodic sediment removal proposed by the inlet management plan.

**Response: The material removed to maintain the preferred channel alignment and position would be bypassed to North Topsail Beach and used to maintain the beach project. This artificial sand bypassing element of the overall management plan would provide a much more efficient sand bypassing mechanism compared to how much material naturally moves past the inlet. While most of the material removed to maintain the inlet would be bypassed to North Topsail Beach, a monitoring program would also evaluate impacts north of the inlet. Should the monitoring surveys indicate that some of the maintenance material is needed on**



**Onslow Beach, this would be coordinated with the US Marine Corps, the US Fish & Wildlife Service, the NC Wildlife Resources Commission, to name a few, to see if disposal of material on Onslow Beach is in the best interest of the existing divers habitats on the island.**

**Under existing conditions, sand movement around New River Inlet occurs sporadically both in terms of direction and quantity. The implementation of an inlet management plan with a sand management component would improve the overall conditions of the adjacent islands.**

8. In regard to the potential for adverse impacts associated with the inlet management plan and offshore sediment removal, the Department believes that predictions made in the DEIS cannot be extended over the entire 30 years of project life, especially in light of the slow, but relentless rise in sea level. Over the course of the project there should be periodic reevaluations of the inlet and barrier island system. The best way to ensure such reevaluations would be a limited time for the DA permit. While the timing of the different aspects of the project is complex, it appears that 2017 would be the year for the completion of phase five of initial construction and the year after the second reconstruction event for the North and Central sections. We recommend that any DA permit terminate at the end of 2017. At that time, the applicant could apply for another permit after submitting data on the geological and biological impacts of the original permit.

**Response: The issue of sea level rise has been incorporated into the FEIS, namely in Section 5 and Appendix F. The issue of the permit lifespan will be determined by the USACE.**

9. Any DA permit for a beach construction project should provide protection for both offshore and near shore hard bottoms against both direct and indirect adverse impacts of sediment extraction and the runoff of fine-grained material from the beach disposal area.

**Response: Sections 5.3.4.3.1 and 5.3.4.3.2 discuss the impacts anticipated towards hardbottom resources. Section 6.4.6 describes the perched beach design which will minimize the runoff of fine-grained material from the beach disposal area.**

10. We believe that greater protection would be provided to valuable hard bottom areas if the

DA permit terminated after the fifth phase of initial construction in 2017. Such a limited permit period would ensure adequate review of all biological and physical data. If, as the DEIS predicts, no adverse impacts occur, additional permits could be obtained for future beach construction. Throughout the project, the Corps should ensure that there is no significant reduction in the total area of hard bottoms, either offshore or near shore, in the permit area.

**Response: The USACE will determine permit limitations and conditions.**

11. We recommend that any DA permit contain conditions to avoid adverse impacts associated with the transport of fill material to the disposal sites. The four corridors from the offshore borrow area were selected to avoid impacts to "potential and probable hard bottom resources" (CPE 2007, p. 258). There is a plan for the visual inspection of submerged pipelines and pipeline corridors (CPE 2007, p. 262). Surface-based observations would be conducted during periods of dredge operation. These observations would include checking for potential leaks which may emanate from the pipeline couplings, other equipment, or other pipeline leaks. All dredge and fill activities would cease if substantial leaks (leaks resulting in turbidity that exceed state water quality standards or sedimentation) are found. Operations may resume upon appropriate repair of affected couplings or other equipment. We recommend that these conservation measures be conditions of any DA permit.

**Response: Noted.**

12. The Corps' public interest review should consider adverse impacts to fisheries resources, particularly those associated with dredging near New River Inlet. In considering work in the southern part of Topsail Island, federal planners noted that New Topsail Inlet is an important passageway for the larvae of many species of commercially or ecologically important fish (USACE 2006, p. 14). Certain species spawn in the ocean and the eggs and larval are carried by natural currents through inlets to estuarine nursery areas. The striped bass, a priority species of the Service, is likely to use New River Inlet to move from the ocean to freshwater spawning grounds. In general, these impacts cannot be avoided in any major beach construction effort using material dredged from inlets.

**Response: Impacts to larval fish will only be incurred directly during dredging operations (through entrainment in the dredge).**

13. The DEIS contains little discussion of the impacts on fisheries resources. The proposed work would negatively impact fish that forage on the beach invertebrates buried during beach construction (CPE 2007, p. 242). However, the fish community in the water column is not likely to be impacted by dredging operations from the low volume noise disturbance (CPE 2007, p. 209). Perhaps, the only ways to assess impacts on fisheries is indirectly through the monitoring of hard bottom areas and beach invertebrate populations. If these elements within the project area remain unchanged, fisheries resources may be sustained.

**Response: Infaunal resources will be impacted directly during dredging and beach fill operations. As mentioned above and in Sections 5.3.3.2 and 5.3.3.3, these resources recolonize rapidly thereby minimizing any long lasting impacts. Because this ecological process is well documented, it is not recommended that a monitoring program be established.**

14. Department recommends that any DA permit require a monitoring program to assess bird usage of their traditional habitats in the permit area. A pre-construction plan has been developed for Topsail to monitor bird habitat along the New River Inlet shorelines, the north end of North Topsail Beach and the south end of Onslow Beach (CPE 2007, pp. 264-265). The plan includes monitoring of piping plover, water birds, colonial water birds and other shorebirds before, during and after construction. These monitoring efforts would occur within the inlet complex to provide information on bird habitat utilization within the permit area. In addition to monitoring, a bird management plan is currently being "considered" for the North Topsail Beach project (CPE 2007, p. 265).

**Response: Section 6.4.1 includes detailed discussion of bird monitoring activities.**

15. The DEIS does not provide details of a shorebird monitoring plan. The Corps should require such a plan as a condition of any permit for the work. The plan should be coordinated with, and approved by, the North Carolina Wildlife Resources Commission.

**Response: Section 6.4.1 includes detailed discussion of bird monitoring activities.**

16. We are concerned that beach reconstruction may become more frequent over time. As sea level continues to rise, the beach fill is likely to be washed away in increasingly shorter periods. Without more frequent beach construction operations, existing structures would be subject to destruction by storm surges and undermining as the shoreline moves landward. Shorter intervals between beach reconstruction operations would reduce the time for the recovery of beach organisms and could increase the risk of near shore hard bottom being buried. An increase in sediment removal from New River Inlet would increase the possibility of significant changes in fish and wildlife habitats in the inlet complex. While the applicant seeks a permit for 30 years of periodic beach construction, the Department recommends that such construction should be reassessed at shorter intervals.

**Response: The frequency of periodic nourishment will not only be dictated by the performance of the beach fill and storm frequency, the ability of the Town of North Topsail Beach to financially support frequent periodic nourishment operations will more-than-likely be the determining factor of when and where periodic nourishment occurs.**

17. The pre-construction bird monitoring plan includes monitoring the piping plover. Any DA permit should include a requirement for pre- and post-construction monitoring of the piping plover and other shorebirds. As noted, the monitoring program should be coordinated with, and approved by, the North Carolina Wildlife Resources Commission. In general, there should be a minimum of one year pre-project monitoring in order to evaluate impacts of the initial channel relocation event and to have some information with which to compare changes after future dredging at the inlet. The pre-project monitoring program may be similar to that employed for the Bogue Inlet Relocation Project (Carteret County, North

Carolina) that was permitted by the Wilmington Corps District. Surveys should be conducted within the inlet complex and should cover both high and low tide cycles. While the applicant should make a commitment for post project monitoring, the actual duration of such monitoring should be left open and dependent on the data collected in the years immediately after initial construction.

**Response: Section 6.4.1 includes detailed discussion of bird monitoring activities.**

18. In order to minimize adverse impact on wintering piping plover, the Corps should require that any pipeline carrying sediment to the beach and placed above the low tide line should be aligned to avoid potential piping plover wintering habitat. The alignment should be coordinated with, and approved by, the North Carolina Wildlife Resources Commission.

**Response: Suggested coordination with NC Wildlife Resource Commission regarding the pipeline route will occur.**

19. Any DA permit for beach construction should require the highest degree of sediment compatibility. As noted, the Sediment Criteria Rule, contained in the Technical Standards for Beach Fill Projects (15A NCAC 07H .0312), provides beneficial guidelines for both grain size and percent weight of calcium carbonate. However, other important characteristics such as organic content, heavy mineral content, and color are not addressed. These aspects of the beach fill should also be considered. The monitoring program for sediment as it is placed on the beach, mentioned above as a benefit to the beach invertebrate community, would also benefit sea turtle nest construction and incubation of the eggs.

**Response: All criteria for sediment, including those as noted under the State Sediment Criteria Rule, are discussed in Section 5.2 and 5.3.3.2. Furthermore, sediment compatibility and scarps are discussed in Section 6.1.1 and 6.2.3.**

20. If significant compaction occurs, tilling may be required after project completion, if the resource agencies determine that remedial action is appropriate. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson, 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to natural beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that tilling will allow a constructed beach to remain uncompacted for up to one year. Multi-year beach compaction monitoring and, if necessary, tilling would ensure that project impacts on sea turtle nesting are minimized.

Compaction monitoring should begin after the material has been graded and dressed to the final slope and a period of time should be allowed for finer particles to be washed away and final settling of the material to occur prior to compaction monitoring. All compaction monitoring should be completed in time to allow for remedial actions to be completed prior to May 1 of each year. Since compaction may be a recurring problem over several years, monitoring should be done in the year following initial construction

and for three subsequent years. Monitoring can be terminated if it is determined that all the sediment placed during the specific construction event has washed away. Remedial action for compacted sediment should be based on data collected during the monitoring program and not performed on a routine basis. Beach tilling should only be performed as a result of an identified compaction problem. The Service opposes routine tilling of the constructed beach without a sediment monitoring program. An annual summary of compaction surveys and the actions taken should be submitted to the Service. This condition will be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year.

**Response:** Following construction of each phase of the proposed project, compaction of placed fill material will be inspected by the Town, the Engineer, or his duly authorized representative in coordination with the Division of Coastal Management and USACE. Compaction monitoring will begin after the material has been graded and dressed to the final slope and a period of time will be allowed for finer particles to be washed away and final settling of the material to occur prior to compaction monitoring. All compaction monitoring will be completed in time to allow for remedial actions to be completed prior to May 1 of each year. If the fill material appears to have a higher degree of compaction than that which is acceptable additional testing such as cone penetration testing will be considered. After subsequent testing, if it is determined that tilling is necessary to reduce compaction based on consultation with the appropriate agencies, the contractor will till the beach to a minimum depth of 36 inches throughout the constructed portion of the beach to loosen the compaction of the placed material. Beach tilling will only be performed as a result of an identified compaction problem based on agency consultation. Beach compaction monitoring and, if necessary, tilling would ensure that project impacts on sea turtle nesting are minimized.

21. The Service requests that the applicant make visual surveys for escarpments along the project area in the year construction ends and for three subsequent years. Surveys should be conducted at a time which would allow for any remedial action to be completed by May 1. Survey results should be submitted to the Service prior to any action being taken. Escarpments that interfere with sea turtle nesting or exceed 18 inches in height for a distance of 100 ft should be leveled to the natural beach contour by May 1.

**Response:** Section 6.2 states that visual surveys of escarpments will be made along the beach fill area immediately after completion of construction, and at three-month intervals for three years following completion of construction. After appropriate consultation with the NCDWM and USACE, escarpments in the newly placed beach fill that exceed 18 inches for greater than 100 ft shall be graded to match adjacent grades on the beach. Removal of any escarpments during the sea turtle hatching season (May 1 through November 15) shall be coordinated with the North Carolina Wildlife Resources Commission (NCWRC), USFWS, and the USACE – Wilmington District.

22. The Service remains concerned about the issue of sediment color which is not considered in the NCDQM compatibility criteria. The Service recommends that material imported for beach construction should be evaluated by an objective criterion, such as the Munsell Soil Color Chart, and compared with sediment outside recent placement areas or a nearby beach which represents the historic beach color. Sediment samples taken to test grain size could also be evaluated for color. The Service reiterates that the quality control to be provided by the applicant should include a quantifiable measure of sediment color and an objective criterion for rejecting mined material which deviates from historic beach sand coloration. The standard for existing beach sediment should not include areas on which sand has been artificially placed. Color evaluations on the beach should extend beyond the upper few inches which may be bleached by sunlight or covered by lighter, windblown sand. Sea turtle nests may extend more than two feet below the surface and color evaluations should extend to depths where the eggs are actually incubated.

**Response:** As stated in Section 6.1.1, although the State rules do not make any reference to compatibility with regards to color, native and borrow area color values were recorded and compiled during field investigations. Native beach composite colors referenced to the Munsell Soil Color Chart (1994) were determined to be gray to grayish brown with a value of 5.4 for wet sand and light gray with a value of 7.0 for dry sand. Borrow area composite colors referenced to the Munsell Soil Color Chart (1994) were determined to be dark gray to olive gray with a value of 4.6 for wet sand and gray to light olive gray with a value of 6.3 for dry sand. This resemblance in color between native and fill material will minimize the risk of changing the natural incubation temperature of sea turtle nests in the nourished area. Although no published data appears to be available it is commonly observed that material placed on a beach undergoes bleaching within the first several months which results in a lighter color sand than what was documented to exist in the borrow area.

23. In addition to assessing color compatibility, the Service recommends that the post-construction monitoring program include a program to measure nest and sand temperatures as compared to an unmanipulated, control area. This would be an effort to assess project impacts on the thermal habitat of sea turtles. The monitoring program should include funding to acquire the use field resistant data loggers and compensation for field work and data analysis. The monitoring program could be coordinated by Matthew Godfrey, the Sea Turtle Coordinator of the North Carolina Wildlife Resources Commission, and Mr. David Rabon of the Service's Raleigh Field Office.

**Response:** The USACE will determine the permit conditions and whether or not sand and nest temperature monitoring will be a necessary condition as part of this project.

24. The Service recommends that project include a plan for monitoring and recovery of stranded sea turtles during each construction event. Stranded sea turtles are live individuals that wash up on the beach in a comatose, debilitated, or otherwise

incapacitated condition. Since all five Atlantic sea turtles may occur in the waters of the project area, the stranding of these species must be considered in project planning.

Some stranded sea turtles can be rescued, treated, and eventually returned to the wild population. The plan would specify a procedure to evaluate these individuals and provide care when appropriate. This aspect of the project could be coordinated through the Karen Beasley Sea Turtle Rescue and Rehabilitation Center in Topsail of Topsail Beach.

**Response: No incidences of sea turtle takes from a hydraulic dredge have been identified during the research and development of this document. Therefore, the use and methods involved with this type of machinery reduces or eliminates the likelihood of an incidental take. The Karen Beasley Sea Turtle Rescue and Rehabilitation Center, located on Topsail Island, recovers and rehabilitates stranded sea turtles from area beaches.**

25. As part of the consultation process mandated by the ESA, the Corps should prepare a Biological Assessment (BA). The BA would describe the impacts of the action to be permitted on federally-listed species that may be affected by the action. The BA can use the information contained in the DEIS if such information is considered accurate by the Corps. The BA could be modeled on the one prepared for the federal beach construction project at the southern end of Topsail Island (USACE 2006, Appendix I). The BA would include your determination of project impacts on these federally protected species. Prior to the issuance, the BA should be submitted to DOI for their concurrence with the Corps' determinations.

**Response: A Biological Assessment has been submitted in support of this project.**

26. The discussions of adverse impacts to the beach, hard bottoms, and estuarine habitats are based on limited survey data. The predicted changes in the project area are based on current knowledge and, perhaps, unrealistic assumptions about the future. It simply may not be possible to accurately predict the reactions of the coastal geomorphology following many years of sediment extraction and beach fill.

**Response: Admittedly, the coastal geomorphology in proximity to barrier islands is dynamic and therefore making it difficult to subtle changes within a specific time frame. However, utilizing the most accurate and up to date data and cutting edge models will provide significant results which can be used to predict changes to the environment.**

27. The Corps permit should require adequate surveillance of both near shore and offshore hard bottoms and measures to ensure that there is no net loss of hard bottom habitat as a result of the permitted action.

**Response: Refer to Section 6.4.6 for the hardbottom monitoring plan.**

28 . In order to assess the changes in the project area environments, the Corps permit should require pre- and post-construction survey for shorebirds, including the piping plover. The scope and duration of these surveys should be coordinated with, and approved by, the North Carolina Wildlife Resources Commission.

**Response: Refer to Section 6.4.1 for the bird monitoring plan.**

29. Since the project area beach provides valuable nesting habitat for sea turtles, primarily the loggerhead, and any Corps permit should ensure that the sediment is highly compatible with the historic beach. The standards of compatibility should extend beyond those factors in the state sediment criteria rules and include the criteria mentioned above, including color. The permit should have conditions for removing incompatible material, rectifying sediment compaction, and eliminating escarpments.

**Response: As stated in Section 6.1.1, although the State rules do not make any reference to compatibility with regards to color, native and borrow area color values were recorded and compiled during field investigations. Native beach composite colors referenced to the Munsell Soil Color Chart (1994) were determined to be gray to grayish brown with a value of 5.4 for wet sand and light gray with a value of 7.0 for dry sand. Borrow area composite colors referenced to the Munsell Soil Color Chart (1994) were determined to be dark gray to olive gray with a value of 4.6 for wet sand and gray to light olive gray with a value of 6.3 for dry sand. This resemblance in color between native and fill material will minimize the risk of changing the natural incubation temperature of sea turtle nests in the nourished area. Although no published data appears to be available it is commonly observed that material placed on a beach undergoes bleaching within the first several months which results in a lighter color sand than what was documented to exist in the borrow area.**

Williams to Sugg 122807

1. The reference cited on p. 107, Munoz-Perez, et al., 1999 on the perched beach is not included in the reference list. I would like to review that reference, but would not hold up proceeding with their report and permit action. The approach for applying the perched beach A factor looks sound, I'd just like to take a look at that report.

**Response: The citation will be added to the Literature Cited section (Section 7).**

2. I'd recommend that the applicant include some type of monitoring program to confirm their predictions post-construction for some period of time (i.e., quarterly or bi-annual for a year or two).

**Response: Refer to Section 6.4 of the FEIS.**

3. I would recommend that the applicant include some discussion of cross-shore storm processes, particularly in the nearshore regions. I would assume that even though the theory says that the coarse material will not extend offshore as far as fine material, storm processes will move significant amounts of sand around. It is highly unlikely that



the hard-bottoms identified have never been influenced or impacted by sand during storm events, and I think the applicant should provide some discussion either acknowledging that likelihood or defending why they think it wouldn't happen.

**Response:** A discussion of the periodic covering and uncovering of hardbottom resources as a result of natural sand movement from longshore drift, persistent high wave energy, and storms is provided in Section 5 of the EIS. Also, a comparison of side scan sonar results offshore of the South Section of North Topsail Beach taken in 2005 and 2006 documented changes in the exposed area of hard bottom. In 2005, the exposed hard bottom area measured 5.25 acres while the 2006 survey found 8.27 acres exposed (Essential Fish Habitat, Appendix 2). This is a clear indication of the ephemeral nature of the near shore hard bottoms under existing conditions. Similar periodic burial and re-exposure of the hard bottom areas are expected to continue under with-project conditions.

Croom (NMFS) to Pulliam 021508

1. Dredging for beach fill in the inlet area is problematic because it will alter benthic habitat in the shoal area and eliminate invertebrate communities that are food for commercially and recreationally important species. Although invertebrate communities may repopulate these areas after the dredging, due to the depth of the area (-18 feet NVGD) benthic populations may not recover to pre-project levels.

**Response:** Dredging within portions of the New River Inlet has occurred on an annual basis since the USACE began sidecast dredging in 1964. Within recent years, the average amount of material dredged from the inlet has ranged from 405,391 cubic yards per year (between 1994 and 1998) and 261,731 (between 1999 and 2002). The proposed project is designed to remove 156,750 cubic yards on an annual basis, which is less than the historical rate of dredging.

As stated in Section 5.3.3.2 and 5.3.3.3, potential effects of sediment removal and other perturbations on benthic prey resources are well recognized (Adriannse and Coosen, 1991; Blake *et al.*, 1996; Bolam and Rees, 2003; Bowen and Marsh, 1988; Carter and Floyd, 2008; Gorzelany, and Nelson, 1987; Hackney *et al.*, 1996; Lindeman and Synder, 1999; Nelson, 1993; Quigley, and Hall, 1999; Ray, 2001). While the removal of sediment will have short-term immediate effects on the organisms residing in the area, several studies of near-shore and estuarine benthic communities have shown that many of these communities are highly resilient to perturbations and have short recovery times (e.g. Bolam and Rees, 2003; de Groot 1979a; Gorzelany, and Nelson, 1987; Johnson and Nelson, 1985; Kaplan *et al.* 1974; Newell *et al.* 1998; Posey and Alphin, 2000; Van Dolan *et al.*, 1984). Nelson and Collins (1987) in their report to the USACE relative to the effects on macrofauna and fish of dredging the sand trap at Sebastian Inlet, Florida, to nourish the downdrift beach, concluded that their statistical analysis of mean abundance of benthic macrofauna and fishes and mean number of benthic macrofaunal species and fishes “do not provide any evidence that the

beach nourishment project at Sebastian Inlet SRA had any measurable effect on these parameters of the biological communities of the nearshore zone.” They further concluded that the “general lack of effects due to nourishment may be in part due to the care which was exercised in the design and execution of this project”.

Many infauna species, including *D. variabilis*, are opportunistic in nature, which provides the dominant taxa with the ability to survive disruptions (Levinton, 1970). As most borrow sites are relatively small in comparison to the surrounding habitats, mobile species will utilize the surrounding and adjacent areas (Posey and Alphin, 2000). Thus, highly resilient benthic communities, relatively small-scale borrow activities, alternate forage areas and the ability of fish to alternate diets in response to prey availability suggests that population effects on fish would be minimal and short-term in nature.

2. We understand the sediments in the inlet area are of a relatively coarse size, which should minimize suspension into the water column; however, this area is a migratory pathway for the young of a variety of fish and invertebrate species and dredging related activities could result adverse effects to young fish and invertebrates that pass through the inlet to reach their estuarine nursery habitats.

**Response:** Studies of dredging and disposal effects on nearshore or estuarine fish populations have reported rapid recovery or minimal effects (Courtenay *et al.*, 1980; de Groot, 1979a; de Groot, 1979b; Holmes, 1987; Posey and Alphin, 2000). Topographic changes in certain borrow areas have also shown to positively affect certain fish by creating refuge or forage areas (Lalancette, 1984).

3. The relocation of the inlet channel will change the direction and intensity of tidal flow during both the ebb and flood tidal cycles. This will result in reconfiguring the inlet channel/shoal complex and could affect recruitment of juvenile fish and invertebrates into estuarine nursery areas. Red drum and blue crabs are especially at risk to dredging and inlet reconfiguration since their spawning activity occurs in and near New River Inlet.

**Response:** The primary purpose of moving the channel in New River Inlet is to reconfigure the ebb tide delta to produce more favorable conditions with respect to shoreline stability on the north end of North Topsail Beach as well as along the south end of Onslow Beach. While model results comparing flows through New River Inlet for the existing condition and with-project condition do not show any appreciable impact on the inlet’s tidal prism (i.e., total volume of water flowing through the inlet) or the distribution of flows through Cedar Bush Cut and the surrounding marsh areas, the model did predict changes in the distribution of flows over the ebb tide delta. These predicted changes in the flow distribution over the ebb tide delta would be conducive to producing the desired modifications in the configuration of the ebb tide delta that would. The resulting

modification in the configuration of the ebb tide delta associated with the new channel position and alignment are predicted to be comparable to that which existed prior to 1984 when the bar channel made its dramatic shift toward Onslow Beach. There is no data documenting recruitment of juvenile fish and invertebrates into the New River Inlet Estuary before or after 1984, however, detrimental impacts on recruitment opportunities with the new channel are unlikely given the similarities between the predicted ebb tide delta configuration with the project compared to conditions that previously existed naturally in the inlet. As most borrow sites are relatively small in comparison to the surrounding habitats, mobile species will utilize the surrounding and adjacent areas (Posey and Alphin, 2000). Thus, highly resilient benthic communities, relatively small-scale borrow activities, alternate forage areas and the ability of fish to alternate diets in response to prey availability suggests that population effects on fish would be minimal and short-term in nature.

4. Dredging will also re-suspend fine material in the borrow area, which can result in clogging the gills of young, less mobile fish and invertebrates and thereby increase their mortality rates.

**Response:** This direct impact is noted within Section 5. The volume of material re-suspended as a result of the proposed project should be substantially less than the amount of sediment put into suspension as a result of the current channel maintenance activities conducted by USACE. In this regard, channel maintenance is performed 3 to 5 times a year with most of the maintenance dredging being performed with side-cast dredges. Side-cast dredges scoop up material from the bottom and discharge it through the water column 90 to 100 feet to the side of the vessel. Within recent years, the average amount of material dredged from the inlet has ranged from 405,391 cubic yards per year (between 1994 and 1998) and 261,731 (between 1999 and 2002). For the proposed project, periodic maintenance of the new channel should only be required every four years and would involve the removal of 627,000 cubic yards or about 157,000 cubic yards/year. However, the material would be deposited along the shoreline of North Topsail Beach not through the water column in New River Inlet. While some maintenance dredging in the new channel by USACE side-cast dredge may be required in the interim 4-year period, the frequency of that activity should be greatly reduced thus resulting in an overall reduction in the quantity of sediment discharged into open waters. With regard to reduced maintenance dredging, the new channel through Bogue Inlet, completed in May 2005, has required almost no maintenance dredging for over 4 years, whereas prior to construction of the new channel, the frequency of maintenance in Bogue Inlet was comparable to that performed in New River Inlet.

5. Placing fill along the surf zone will adversely affect this EFH.

**Response:** Impacts to the wet beach are discussed in Section 5.3.3.3.

6. The proposed project is not a one-time event but a 30-year project. The public notice indicates that maintenance dredging will be required to maintain the proposed channel re-alignment every four years. However, based on our experience with other projects of this type, the actual frequency of dredging to maintain the new channel alignment would vary and is difficult to predict. As such, it is reasonable to expect maintenance may be required more frequently than currently predicted.

**Response:**

**The only project in North Carolina comparable to the one proposed for New River Inlet was that associated with relocating the channel through Bogue Inlet. The new channel through Bogue Inlet has not required any maintenance dredging since its completion in April 2005 and currently has a controlling depth of 8 feet relative to mean low water.**

**In any event, one of the controlling factors that will have an overriding influence on when the channel is maintained is the ability of the Town of North Topsail Beach to fund the operation. Given the existing economic climate and financial situation for the Town, a four year maintenance interval is optimistic.**

**Predicting channel stability is subject to some uncertainty, however as mentioned above for the case of the relocated channel through Bogue Inlet, no maintenance of the channel has been needed since completion of the new channel in April 2005. Pre-project planning documents for the Bogue Inlet project indicated maintenance dredging in Bogue Inlet by the USACE would probably resume within two years following the movement of the channel. Therefore, in that particular instance, predictions overestimated maintenance requirements. This is not to say the New River Inlet channel will behave in a similar manner, but it does indicate that the 4-year maintenance cycle used in the analysis could underestimated the stability of the channel.**

7. NMFS is also concerned that dredging the inlet's ebb tide delta for fill is not in the best interest of our trust resources. In this case, the proposed dredging involves relocating a navigation channel that has been maintained by the Corps as a part of a federal navigation project. For this reason we are considering the proposed channel realignment. However, the current scope of proposed dredging far exceeds the channel dimensions and volume of material historically dredged by the Wilmington District. NMFS understands that the applicant needs coarse fill material for the North Section so that the seaward the equilibrium-toe-of-fill toe of fill will not encroach upon and adversely impact nearshore live/hard bottom. However, we question whether it is in the best interest of fisheries to alter large areas of inlet EFH to avoid impacts to live/hard bottom EFH. North Topsail Beach identified one section of the selected offshore borrow site that has coarse material for use in areas with nearshore live/hard bottom. We believe that additional effort should be made to locate additional coarse sand offshore prior to allowing use of inlet ebb tide delta as a borrow site.

**Response:** The availability of additional coarse sand resources offshore of North Topsail Beach would not address the primary purpose of moving the channel which is to change the configuration of the inlet's ebb tide delta in order to produce conditions that would be conducive to inducing accretion on the extreme north end of North Topsail Beach and reducing erosion rates on the south end of Onslow Beach. This is similar to the goals associated with the relocation of the Bogue Inlet ocean bar channel which was successfully completed in April 2005. The maintenance component of the plan is in recognition that the new channel location will not be permanent and would have to periodically maintained to keep it in the preferred corridor. If in fact an alternate source of coarse material was identified and utilized in lieu of realigning the inlet, the objectives of the project will not have been met as the current rate of erosion along the north end of North Topsail Beach will not be abated.

8. Page 5, paragraph 4 – This section describe the historic maintenance of New River Inlet. For future reference, it should be noted that NMFS does not oppose the continued maintenance dredging of the inlet channel and the discharge of the resulting dredged material on the ocean beach. However, the scope of work proposed by the applicant does not follow the natural deepwater channel and the volume of material to be dredged exceeds what is required to address navigation needs.

**Response: Noted.**

9. Page 7 Table 1 – This table identifies 31 threatened structures. While we are sympathetic to the plight of these property owners, it has long been clear that these properties are located in an area where, due to the likelihood of unstable conditions, the federal government would be unwilling to expend funds to protect the shoreline.

**Response:** The extreme north end of North Topsail Beach, which is being affected by the changes in New River Inlet, is not included in the Coastal Barrier Resource Act (CBRA) zone as shown in Figure 4 in Section 1.7.5. The federal government would not participate in a project to protect development in this area if the benefits associated with the project do not exceed its cost. In this regard, prior to the shift in the channel orientation, the north end of North Topsail Beach accreted. It was during this accretionary period that most of the existing development came into being.

10. Page 27, 3.2.3 Alternative 3 Applicant Preferred Alternative – We understand the advantages of a long-term, non-federally funded plan to address beach erosion at North Topsail Beach. At issue is the plan to mine the New River Inlet's ebb tide shoal for sand and relocation of the channel away from the center of the inlet to an area directly adjacent to the northern end of Topsail Island. While modeling may predict a stable channel at this new location, we are puzzled by seemingly disparate modeling results and management strategies proposed here with respect those proposed for Mason Inlet. The Mason Inlet channel was relocated to the center of the inlet in order to prevent rapid erosion along the southern shoulder, which threatened existing structures. The

final EIS should provide a detailed explanation of how models of seemingly disparate strategies nonetheless show stable inlets will result.

**Response:** The project for Mason Inlet was totally different than the project being proposed for North Topsail Beach. In the case of Mason Inlet, the whole inlet was migrating rapidly to the south and threatened development, including a large hotel/condominium located on the extreme north end of Shell Island. The plan to protect the north end of Shell Island involved the whole-sale movement of the entire inlet to the north away from the development and closure of the existing inlet not just the relocation of the channel. Maintenance of the Mason Inlet project is predicated on keeping the new inlet totally within the permitted inlet corridor.

The rapid southward migration of Mason Inlet was primarily attributable to a reduction in the inlet's tidal prism, i.e., the volume of water flowing through the inlet during flood and ebb stages. The reduced tidal prism was caused by shoaling of the interior channels including Mason Creek which connects the inlet to the Atlantic Intracoastal Waterway. Therefore the overall management strategy for Mason Inlet is aimed at keeping the flow pathways open and preventing the inlet from moving out of the permitted corridor.

In the case of the management plan for New River Inlet, only the ocean bar channel crossing over the ebb tide delta would be relocated, not the entire inlet. As the modeling results demonstrate, modification to the inlet bar channel would not change the tidal prism of the inlet.

Neither the Mason Inlet model results nor the model results for this project indicated stable inlets or channels. In the case of the Mason Inlet project, periodic maintenance dredging is required to keep the channel in its preferred corridor. Since the construction of the Mason Inlet Project, the volume of material removed from the channel and associated spit has been comparable (within 10%) of the predicted volume for maintenance. Maintenance events have become more frequent; however these events are employing less invasive methods of maintenance such as upland removal of the spit and truck haul operations as opposed to only using dredge and fill methods (Gibson, C. pers. comm.; Gahagan and Bryant Associates, Inc., pers. comm.). As for the modified channel through New River Inlet, channel maintenance would be needed to keep the channel in the preferred corridor. In the absence of channel maintenance the inlet channel would be expected to migrate back toward Onslow Beach as it has done in the past. This would reinitiate an erosion episode similar to that which has occurred over the last 20 years or more.

The management plan for New River Inlet includes two maintenance triggers to assure the channel stays in its preferred corridor. One maintenance trigger is based on shoaling in the new channel while the second addresses movement of the channel out of the preferred corridor. Nothing in the EIS including the

**Engineering Analysis (Appendix B) purports to represent the new channel as being stable. The Engineering Analysis discusses shoaling potentials in the new channel as well as the possible migration of the channel out of the preferred corridor.**

11. Page 33, paragraph 2 – According to this paragraph, the point-of-intercept for beach fill would be some 800 linear feet landward of the nearshore hard bottom. Specific detailed information regarding how this will be monitored during the construction of the project should be provided.

**Response: Refer to Section 6.2 and 6.4.6 for the FEIS.**

12. Page 33, paragraph 3 – The DEIS states that under the applicant's preferred alternative, the subject beach section will require 15 years to recover. Do we have sufficient data to ensure that periodic removal of coarse sand from the inlet to maintain this highly erosive section of beach would not alter the configuration and flow patterns of New River Inlet?

**Response: One of the primary purposes of the new channel through New River Inlet is to alter flow patterns into and out of New River Inlet in order to effect a change in the configuration of the delta that would produce a favorable shoreline response on the extreme north end of North Topsail Beach. Geomorphic analyses of the inlet conducted by Dr. William A. Cleary, UNCW, demonstrated the dependency of the condition of the north end of North Topsail Beach on the position and orientation of the ebb tide bar channel of New River Inlet. The predicted 15-year recovery period was taken into account in determining the damage reduction potential of the project along the extreme north end by assuming a gradual increase in the width of the beach associated with the reconfiguration of the ebb tide delta of New River Inlet. The 15-year recovery period was based on observed shoreline responses associated with changes in the position and orientation of the inlet bar channel. In this regard, the 15-year recovery period is considered to be conservatively long as it does not take into account the material that would be placed along the north end during channel maintenance activities.**

**Initially, the nourishment provided approximately every four year from maintenance of the new channel may not be able to keep pace with the expected volume losses. This would keep the potential for damages in this area rather high for at least 5 years. Over time, the new ebb tide delta configuration associated with the new channel would begin to influence sediment transport along the north end of the island resulting in a gradual increase in the width of the beach. Again as a point of emphasis, the recovery of the north end of North Topsail Beach is directly tied to the position and orientation of the inlet bar channel not the volume of material that would be placed in the area.**

13. Page 54, paragraph 2 – This paragraph does not indicate whether all potential offshore sources of coarse sand were explored. The inlet is the easiest source to find for coarse sand. NMFS believes that additional effort should be expended to locate additional, alternative offshore sources.

**Response:** The primary purpose of the proposed channel through New River Inlet is to move the channel to a preferred position and alignment which, based on the geomorphic analysis of the inlet provided in Appendix B of the EIS, would allow the extreme north end of North Topsail Beach to return to a condition comparable to that which existed in the early 1980's or prior to the movement of the channel toward Onslow Beach. While coarse sand is needed to prevent impacts on near shore hardbottoms, simply finding additional sources of coarse material offshore would not address the inlet channel related shoreline impacts that the new channel is designed to mitigate. The utilization of the material from the inlet is secondary to the purpose of the project. Realigning the inlet will help alleviate the erosion issues on the northern end of Topsail Island.

14. Section 4.2 Threatened and Endangered Species – This section does not identify the threatened and endangered marine mammals that could occur off North Topsail Beach. Since a dredge will be operating in offshore waters, appropriate species should be identified and the probability of impacts assessed. Please contact our Protected Resources Division to examine this issue further.

**Response:** Please refer to the Biological Assessment drafted in support of this project. Discussions regarding threatened and endangered marine mammals are included in this document

15. Page 85, paragraph 2 – This section describes marine intertidal and subtidal beach habitats. However, unlike other section, no information is provided on fish and invertebrates commonly found in this area.

**Response:** Please refer to the Essential Fish Habitat Assessment in support of this document for information regarding the fish and invertebrates commonly found in this area.

16. Page 105, Benefits of Inlet Complex Habitats to Fish – This section should be expanded to address coastal pelagic species, such as king and Spanish mackerel and bluefish, which seasonally utilize the inlet as a feeding area.

**Response:** Refer to the Essential Fish Habitat document for more information regarding pelagic species such as cobia, king mackerel, Spanish mackerel, and bluefish. As the document indicates, these species are primarily pelagic and are unlikely to be present within the Permit Area during the winter construction schedule when temperatures will be below their preferred minimum (NCDENR, 2006). Therefore, the effects on this species should be minimal.



17. Page 146, General Environmental Consequence – NMFS is concerned that channel alterations of the magnitude proposed under several alternatives, including the applicant's preferred alternative, may have unanticipated adverse effects on the configuration and function of inlet habitats. For example, extensive dredging to relocate the channel at Bogue Inlet resulted in the formation of a new channel not predicted by modeling.

**Response:**

**The breaching of the sand spit inside Bogue Inlet and reopening of the Coast Guard Channel was due to Hurricane Ophelia not the channel relocation project. Possible breaching of the sand spit was a concern prior to the construction of the new channel. While there have been some minor issues with the response of Bogue Inlet to the new channel, for the most part the preproject predictions on inlet and shoreline response have been realized. These predictions include the reformation of the sand spit off the west end of Emerald Isle, erosion of the shoreline east of Bogue Inlet, accretion on Bear Island, and reconfiguration of the inlet's ebb tide delta.**

18. Page 192, paragraph 1 – NMFS agrees that frequent maintenance of the relocated channel and the discharge of this material on the northern section of beach could result in net cumulative adverse impacts to important beach infauna communities. The extent of this impact is dependent on the frequency of disposal and recovery time between disposal events. NMFS recommends that consideration be given to transplanting appropriated infauna species, such as coquina clams, using technology developed by at Dr. Skip Kemp at Carteret Community College.

**Response: Refer to Section 6.4.5 for a description of inclusion of Dr. Skip Kemp's technology in this project.**

19. Page 203, 5.3.4.3 Hard Bottom Communities – The project incorporates measures intended to avoid adverse impacts to nearshore hard bottom communities. However, NMFS recommends that this or other appropriate sections provide a detailed description of the measures to be incorporated to avoid impacts, how impacts will be measured, and how future nourishment events may change to ensure avoidance of adverse impact to live/hard bottom EFH.

**Response: Refer to Section 6.1, 6.2, and 6.4.6 for detailed description of minimization measures to avoid adverse impacts to hardbottom resources.**

20. Page 232, 5.17 Applicant Preferred Alternative – NMFS recommends that the DEIS be revised to include a modified applicant preferred alternative to include the following: Alternative 3.1 – This alternative would involve a reduction in size of the coarse sand borrow site in the inlet and exploration of alternative offshore sites for additional coarse sand. NMFS is concerned with sand mining of the ebb tide delta solely for beach nourishment. We would consider maintenance of the federal navigation channel at the new location but believe the proposed scope of dredging in the inlet is

excessive and could have currently unknown changes in the inlet characteristics and function.

**Response:** The suggested “Alternative 3.1”, would not satisfy several of the project’s purpose and needs as outlined in Section 1 of the FEIS. These include the long-term stabilization of the oceanfront shoreline located immediately south of New River Inlet and the reduction or mitigation for historic shoreline erosion along 11.1 miles of oceanfront shoreline of North Topsail Beach. The primary purpose of realigning the channel through New River Inlet is to move the channel to a preferred position and alignment which, based on the geomorphic analysis of the inlet provided in Appendix B of the EIS, would allow the extreme north end of North Topsail Beach to return to a condition comparable to that which existed in the early 1980’s or prior to the movement of the channel toward Onslow Beach. Periodic maintenance of the new channel will be needed to keep the channel in the preferred corridor. Accordingly, maintenance of the new channel is keyed on keeping the channel properly positioned and aligned in order to create the desired shoreline response on the north end of the island not on beach nourishment needs for the shoreline south of the inlet. Therefore, the inlet would not be “mined” solely for beach nourishment material.

**The expected changes to the inlet’s flow regime and configuration of the ebb tide delta associated with the proposed channel are fully described in Appendix B of the EIS.**

21. Page 255, 6.0 Mitigation, Minimization and Avoidance Measures – This section should be revised to include a inlet change monitoring plan that uses digital aerial photography to map EFH within the inlet area on an annual basis for five years. The first photography would be acquired prior to project construction and serve as a baseline for future study of habitat changes in the inlet. After five years, the Wilmington District and NMFS would consult and determine if additional photography is justified. Any changes in the area of the mapped EFH habitat should be documented. In addition, mitigation should be provided for losses of shallow subtidal and intertidal EFH in the inlet area that would occur as a result of construction and maintenance (refer to the Mason Inlet Relocation Project constructed by New Hanover County). This recommendation for mitigation would not apply if the North Topsail Beach scaled back its projected use of New River Inlet’s ebb tide delta to be commensurate with the scale of the current maintenance practices for federal navigation channel. We understand that the North Carolina Division of Coastal Management will require mitigation for encroachment on the designated buffer for live/hard bottom communities. NMFS supports this initiative and request that details of this plan be included in the final EIS.

**Response: Refer to Habitat Mapping in Section 6.4.6.**

Response to NCWRC comments Aug07

1. The analysis assumes relocation of the New River inlet channel will protect houses on the north end of NTB, even though engineers indicated uncertainty about this in PDT

meetings. This uncertainty needs to be reflected throughout the DEIS. Erosion rates could increase because less sand will be transported to the islands as a result of sand moving into the inlet to rebuild the mined ebb tide delta. If erosion rates do not decrease as a result of the relocation, there is no need for the relocation. If the purpose of maintaining the channel is for use as a sand source, then this needs to be a stated objective of the project.

**Response:**

**The Engineering Report discusses the uncertainty associated with the eventual recovery of the shoreline along the north end of North Topsail Beach. The uncertainty is represented by the predicted 15-year recovery period during which time development located in the area would be subject to continued storm damage threats, albeit, at a gradually reduced risk rate.**

**The revised plan includes placement of additional advanced nourishment (12.1 cy/lf) in the area to help offset some of the uncertainty and risk associated with shoreline recovery following channel relocation.**

**With regard to decreased sand supply to North Topsail Beach due to channel shoaling, the plan calls for bypassing the trapped sediment every 4 years to North Topsail Beach. This would create a condition of guaranteed sand supply versus the present situation where material trapped does not return to North Topsail Beach on a regular or predictable basis.**

**Maintenance of the new channel is required in order to facilitate the recovery of the north end. If maintenance did not occur on a regular basis, the channel would probably migrate to its present position, thus reinitiating the erosion condition that has created the present problem. Maintenance of the channel is not considered to be mining of the ebb tide delta; rather, it is similar to channel maintenance operations carried out in many of the North Carolina Inlets. The major distinction for the New River Inlet channel is the maintenance material would be put back into the littoral system similar to what is presently being done at Oregon Inlet and the Cape Fear River Entrance. Thus, the plan would provide for a more reliable navigation channel while also providing a renewable source of beach quality material.**

2. The preferred alternative calls for maintaining a 500 foot wide, 15 foot deep channel. This is much larger than the current authorized dimensions of the channel (90 feet wide and 6 feet deep). We question the need for such a large channel and have concerns about impacts to surrounding habitats. The PDEIS needs to better explain why these dimensions were selected. It appears that the purpose is to have enough sand for periodic nourishment. Whether or not the flow dynamics model took into account the increased size of the channel is not explicitly stated.

**Response:**

**Three channel alternatives were evaluated in the numerical model to determine impacts on flow volumes (tidal prisms), flow patterns, currents, and circulation within the estuarine channels. The channel selection was ultimately based on**

**which alternative provided the greatest assurance that the resulting flow patterns would lead to the ebb tide delta evolution needed to result in recovery of the north end of North Topsail Beach. Volumetric shoaling channel was not a factor in the selection of the channel. All three alternatives were evaluated for a depth of -18 feet NAVD (approximately -15 feet MLLW) with widths of 300, 400, and 500 feet. A detailed discussion of the numerical model and channel selection criteria is provided in the Engineering Report (Appendix B?) of the PDEIS under the section entitled “HYDRODYNAMIC MODEL”.**

3. The soundside salt marshes should also be included in the permit area. These areas will be impacted by beach nourishment and the construction and maintenance of a storm berm. Especially on the north end, the presence of a storm berm will prevent overwash fans from forming in the marsh. The overwash fans create habitat and provide for landward migration of barrier islands resulting in extension of marsh into the estuary behind the island as it migrates.

**Response:**

**During Hurricane Fran, the northern 1.5 to 2 miles of North Topsail Beach did not experience significant overwash that penetrated across the entire island. This was due to the rather extensive dune system and relative wide beach characterizing the area in 1996. Major overwash and island breaching did occur during Hurricane Fran beginning approximately 2 miles south of New River Inlet.**

**The material that was washed into the marshes during Hurricane Fran remains today but most of the material that was deposited on the roads and other upland areas was removed and returned to the beach or bulldozed to reconstruct the dunes.**

**The main purpose of the beach fills proposed for North Topsail Beach is to counter long-term erosion. While some storm damage reduction will occur as a result of the wider beach and relative small artificial dune, overwash will still occur during severe storms comparable to Hurricanes Bertha (July 1996) and Fran (September 1996). Note that overwash only occurred during these more significant events as little or no overwash was associated with the storms that impacted the area between 1998 and 1999 (Hurricane Bonnie in 1998, and Hurricanes Dennis, Floyd, and Irene in 1999).**

4. The document fails to discuss the possibility that the project on N. Topsail will accelerate erosion on adjacent Onslow Beach. This needs to be measured and commitments set in place to address increased erosion if it occurs. Potential loss of shoreline on Onslow Beach needs to be addressed as a negative impact of the preferred alternative. Even if Onslow Beach is also nourished, there is a significant negative impact for it is necessitating the nourishment of a once natural stretch of barrier island.

**Response:**

The potential impacts of the Alternative 3 (Applicant's preferred alternative) on the overall sediment budget of the area around New River Inlet was presented in Appendix B (Engineering Analysis). The with project sediment budget predicted a potential increase in the sediment deficit on the south end of Onslow Beach from 97,000 cubic yards/year today to 121,000 cubic yards/year with the project. An earlier plan included in a feasibility report prepared for the Town of North Topsail Beach recommended placing material on the south end of Onslow Beach to offset the increase in the sediment deficit. Discussion with the PDT, particularly the US Marine Corps, determined the Marine Corps did not favor beach nourishment as it would not be consistent with its recently adopted Integrated Natural Resource Management Plan (INRMP). The Marine Corps favored a beach monitoring plan. Should the beach monitoring reveal significant impacts, mitigative measures would be developed with the Marine Corps working in cooperation with the NC Wildlife Resources Commission and the U.S. Fish and Wildlife Service.

5. The document should include some discussion of increasing sea level rise and how this will impact the various alternatives. In addition to the accelerated erosion rate that the project area is experiencing, the current estimated rise in sea level should be included in the no construction alternative.

**Response:**

The impact of sea level rise on shoreline recession rates along North Topsail Beach are presented in Appendix B in the Section entitled "EXISTING SEDIMENT BUDGET". The rate of sea level rise applicable to North Topsail Beach is around 0.0125 ft/yr or 1.25 feet per century. The portion of the existing shoreline recession rates associated with this rate of sea level rise was estimated to be 0.5 foot/year. Compared to the shoreline recession rates being experienced along most of North Topsail Beach, sea level rise appears to be a minor component. Should sea level rise accelerate, only the sea level rise component of shoreline recession would be affected. For example, should sea level rise double over the next century, the sea level rise component would increase to 1.0 foot/year.

The existing rate of rise in sea level has not appeared to have an impact on the performance of the Wrightsville Beach and Carolina Beach shore protection projects as nourishment rates have remained fairly constant over the last 25 to 30 years.

6. Comment regarding coarse material.

**Response:** Coarse material, which would be derived from New River Inlet and portions of the offshore borrow area, would only be placed in areas where nearshore hard bottoms encroach close to shore. This was an engineering compromise developed to avoid potential impacts on the nearshore hard bottoms during post-fill adjustments.

The mean grain size of the native material that resides on the foreshore of North Topsail Beach, that is the area between the top of the berm and mean low water, averages 0.27 mm. Existing foreshore slopes range from 1V:22H to 1V:25H. The mean grain size of the coarse material in the offshore borrow area is 0.33 mm while the inlet material has an average mean grain size of 0.36 mm. The intent of the coarse fill placement is to develop points of intercept of the fill material well landward of the nearshore hard bottoms. Obviously, this will create slightly steeper slopes in the nearshore area. However, the mean grain size of the coarse material from the two borrow sources is not radically different from the mean grain size of the existing foreshore material, therefore, the anticipated slope of the foreshore after nourishment should be relative close to the same slope as the existing foreshore. The portion of the fill residing seaward of mean low water will develop a steeper slope as it intercepts with the existing profile in depths ranging from 15 to 20 feet in the area opposite Hampton Colony and in depths of 10 to 15 feet along the northern 3 miles of the project area.

7. Comment regarding the impact of storms.

**Response:** The impact of storms on North Topsail Beach was evaluated for the without project condition as well as for the various beach fill alternatives considered (Appendix B). The analysis indicates that even with beach fill, development along North Topsail Beach will remain vulnerable to damage by severe storms, i.e., storms comparable to Hurricane Fran. In the case of the extreme north end, the analysis considered the potential for storm damage over the 15-year predicted recovery period and beyond. The analysis again showed that the development at the north end would remain vulnerable during the recover process and would continue to experience storm damage even if the shoreline fully recovers.

8. Comment regarding nesting bird habitat on disposal islands.

**Response:** The disposal islands are used periodically by the Corps of Engineers during maintenance of the AIWW and Cedar Cut. However, recently, the Corps has elected to deposit the material on the north end of North Topsail Beach in keeping with the sated objectives of the NC Division of Coastal Management rules and guidelines that require all beach compatible material dredged from navigation channels to be returned to the littoral system. Accordingly, any change in the current disposal practice would have to be coordinated with both the Corps of Engineers and NCDCM.

In any event, the amount of material that would accumulate in New River Inlet and Cedar Bush Cut under Alternative 3 appears to exceed the volume needed to maintain the beach fill in the Central and North sections of the project area. Accordingly, some of the shoal material could be allocated to the upland disposal areas without compromising the integrity of the project.

9. Comment regarding incompatible material.

**Response:** The geotechnical investigations and evaluations of the potential borrow areas were accomplished under the umbrella of the new State sediment standards that went into effect on February 1, 2007. Based on the detailed sampling and analysis of the material in the offshore borrow area and in New River Inlet, the two sources appear to be free of the type of material that created problems along Bogue Banks and Oak Island. However, there is always the possibility pockets of incompatible material may be encountered during the dredging operation. To address this, contract documents will include continuous monitoring of the nourishment operation and should incompatible material be observed, the dredge will be directed to relocate to a more suitable portion of the borrow area. Typically, permit conditions will dictate what type of response is required to correct or remove incompatible material.

Townson (USMC) Sugg 012908

1. The document could more thoroughly explain the predicted results for Onslow Beach. It predicts (for the preferred alternative) a potential increase in beach on the south end, but also says (on page 240) that Onslow Beach dune communities will be negatively impacted by the periodic maintenance of New River Inlet and nourishment of Topsail Beach. It's not clear how this project will have both a negative impact on the dunes, but a positive impact on the amount of beach. It would be helpful if this could be explained more fully, perhaps with maps showing the predicted outcome.

**Response:** The proposed channel would result the onshore movement of material from the north side of the existing ebb tide delta which would weld to the south end of Onslow Beach creating a gradual increase in the width of the beach on the extreme south end of the island. This increase in beach width on the south end of Onslow Beach would be a one-time event that could take 5 to 15 years to occur. Farther north, the new channel position and alignment would reduce but not totally eliminate erosion along Onslow Beach. The continued erosion of the shoreline north of the inlet, albeit at a reduced rate, would impact existing dunes.

2. The Environmental Consequences section could more fully outline potential impacts (both positive and negative) to threatened and endangered species. Would this increase potential nesting habitat for shorebirds and turtles, and increase habitat for seabeach amaranth on Onslow Beach? Is it possible that it would have negative impacts? It mentions consultation with U. S. Fish and Wildlife Service and National Marine Fisheries Service, but doesn't say what species and what impacts they will be consulting on.

**Response:** Please refer to Section 5 and Appendix F (Cumulative Effects Assessment) for more information regarding the environmental impacts pertaining to threatened and endangered species found along Onslow Beach.

3. Page 51. Onslow Beach is approximately 7 miles, not 11. Onslow Beach plus Brown's Island is approximately 11 miles. In the last sentence in this paragraph change 11 acres to 11 miles.

**Response: Noted.**

4. Page 60. Current data for sea turtles is available from Camp Lejeune's Environmental Management Division if desired. The red knot, a candidate for Federal listing, is not mentioned in the birds section.

**Response: At this time, the data included within the FEIS will suffice for evaluation of alternatives.**

5. Page 72. Manatee. A dead manatee was found in the New River in January 2004.

**Response: This information has been included.**

6. Section 4.11 Historic Properties and Cultural Resources, pages 135-136: Sec 4.11.1 Offshore Borrow Area Cultural Resources. This section recommends underwater survey of approximately 333 acres at the offshore borrow site, and indicates the negotiation for studies was underway and results would be available in late 2007. Appendix E contains only the 2005 underwater survey results for the Inlet area. When these results are available they should be included in this section and in Appendix E.

**Response: This information has been included.**

7. Section 4.11.2 New River Inlet Channel Cultural Resources. This section refers to the original 2005 underwater survey results (in Appendix E report), and references findings and recommendations for shifts, as well as additional studies required based on 2005 recommendations. Specifically, shifts resulting from 2005 study would require further investigation. This section indicates that new study results would be available in late 2007. As with previous section, the 2007 results are not included.

Response: Additional investigations were conducted; see Appendix E (A submerged Cultural Resources Remote-Sensing Survey New River inlet Channel Realignment Onslow County, North Carolina, 2007)

8. The DEIS should incorporate results of 2007 underwater cultural resource studies for Offshore Borrow Area and New River Inlet area in Section 4.11 and Appendix E. Recommendations from the new study should be followed to identify, avoid or minimize/mitigate impacts to underwater cultural resources.

**Response: This has been addressed in Section 4.11**



Legrand to McGee 011608 (letter from NWRC)

1. The DEIS should explain the purpose of maintaining a 500 foot wide, 15 foot deep channel as recommended for the preferred alternative. This is much larger than the current authorized dimensions of the channel (90 feet wide and 6 feet deep). We have concerns about impacts to surrounding habitats and the need for such a large channel. Also, the engineering model results which indicate no changes in flow dynamics of the main ebb channel and tributary channels as a result of the channel realignment. Did this model consider the change in the size of the channel?

**Response:** The model investigations evaluated 3 channel widths, 300 feet, 400 feet, and 500 feet. Flow volumes and flow distributions between the inlet and the Atlantic Intracoastal Waterway were similar for all three channels and essentially the same as under existing conditions. The factors leading to the selection of the 500-foot wide channel were primarily associated with model predicted changes in the distribution of flows over the ebb tide delta that would tend to produce the desired reconfiguration in the shape of the ebb tide delta. In this regard, the flow patterns predicted with the 500-foot wide channel indicated a significant reduction in the volume of flow over the north side of the ebb tide delta which would facilitate more rapid onshore movement of the material and hasten the evolution of the ebb tide delta to a more favorable configuration with regard to its impacts on the north end of North Topsail Beach.

2. The document does not discuss the possibility that the project on North Topsail will accelerate erosion on adjacent Onslow Beach. The DEIS states that shoreline erosion rates on both sides of the inlet will be reduced under the preferred alternative. However, prediction of erosion rates is difficult. Increased erosion rates have occurred along certain sections of shoreline adjacent to the two inlet channel relocation projects previously undertaken in the state. Given the proposed size of the new channel, increased erosion rates are possible and should be considered. Erosion rates should be measured and contingency plans set in place to address increased erosion if it occurs. Furthermore, potential loss of shoreline on Onslow Beach needs to be addressed as a negative impact of the preferred alternative.

**Response:** The anticipated shoreline impacts along Onslow Beach are discussed in Section 5.3.2.2 and 5.3.3.2.

3. The DEIS does not provide an adequate description of the benthic resources or impacts of the various alternatives on the benthic resources. While some of our initial concerns were addressed following comments on the PDEIS, we continue to be concerned about long term and cumulative impacts to benthic resources. Ample literature on macro invertebrates is available, yet the DEIS has a limited literature review. The document cites a few papers indicating benthics can withstand some burial and concludes that invertebrate populations will recover within weeks or months. While high quality beach fill material and timing of placement will minimize impacts to beach

invertebrates, we still have concerns over short term, long term, and cumulative impacts of this project. It is unclear ~ when peak recruitment time for macro invertebrates occurs on North Topsail Beach. A study on Pea Island found peak recruitment of coquina clams was in March and concluded that nourishment in March or April would depress the population in the region of nourishment for at least a full year (Donoghue 1999). Even if invertebrate populations fully recover within one year of the project, this is still a significant amount of time with depressed food resources available to foraging shorebirds over a large area. It is also unclear what impacts the project will have over the long term on wave energy climate and beach slope. These are two key factors important to macro invertebrates (McLachlan 1990, McArdle and McLachlan 1992). Peterson et al. (2000) also raises this concerns writing " ... longer-term impacts are possible arising from persistent modifications of the physical environment." From the engineering report, it appears some of the material to be placed on the beach will be coarser than native material. Coarser material can inhibit the burrowing of beach infauna (Alexander et al. 1993, Bowman and Dolan 1985, Manning 2003, Peterson 2000) and can steepen the foreshore, reducing the wet habitat area (Peterson et al. 2006, Peterson et al. 2000).

**Response: The environmental consequences as they pertain to infaunal resources are discussed in Sections 5.3.3.2 and 5.3.3.3 of the FEIS. Furthermore, information regarding these impacts are discussed in Appendix F (Cumulative Effects Assessment). Section 6.4.5 includes a description of a *Donax* research study which will be implemented prior to construction.**

4. Some of our initial concerns about impacts to the benthic community have been addressed in the impact analysis, but no research is planned to monitor cumulative effects. While quite a bit of work has been done examining the impacts of beach nourishment on invertebrate populations, we still do not fully understand effects on the natural resources. For example, we do not know what the cumulative impacts of multiple nourishment events are on invertebrate populations. There is simply not enough information to say there will be no long term and cumulative impacts on invertebrate populations from a 30-year project. Additionally, few studies associated with beach nourishment have looked at body size of invertebrates in addition to abundance on renourished beaches (Peterson and Bishop 2005). It is possible that most repopulation occurs from larval recruitment thus decreasing the size of prey items available to shorebirds and fish. There is also very limited information on the invertebrate communities at inlets and how inlet stabilization impacts these communities. Lastly, much work is needed to fully understand fundamental processes in the natural beach system (Peterson and Bishop 2005).

**Response: It is recognized that there will always be work needed to fully understand processes in the natural beach system as these systems are complex and dynamic. As mentioned above, the environmental consequences as they pertain to infaunal resources are discussed in Sections 5.3.3.2 and 5.3.3.3 of the FEIS. Furthermore, information regarding these impacts are discussed in Appendix F (Cumulative Effects Assessment). Section 6.4.5 includes a**

**description of a *Donax* research study which will be implemented prior to construction.**

5. The DEIS addresses the importance of natural barrier island functions, such as island overwash in some sections, but it is treated inconsistently throughout the document and was not taken into consideration in most of the impacts assessment (see specific comments for examples). Nourishment and dune construction prevents overwash and contributes to a loss of habitat for breeding and non-breeding waterbirds, including piping plovers. According the Atlantic Coast Piping Plover Recovery Plan (USFWS 1996), nourishment of eroding beaches impedes overwash that would otherwise create and maintain ephemeral pools and bayside mudflats; preferred piping plover habitat. Tidal flats and ponds are important feeding areas to piping plovers at the start of the nesting season and at other times of the year (Fraser 2005). These areas are created during storm-caused overwash and other erosional processes (Leatherman 1982), and beach stabilization efforts reduce the number and extent of these overwash events (Dean 1999). Beach stabilization, dune construction and disruption of natural processes (erosion, accretion, overwash, longshore transport, etc.) are listed as major contributing factors to the loss of suitable breeding and non-breeding habitat for colonial waterbirds (Hunter et al. 2006). Overwash is also important in maintaining barrier islands. Where large dunes prevent overwash, beach sediment in front of the dunes can be transported offshore during storms causing the island to narrow, while if overwash is allowed to occur, the net volume of sand is often maintained and the island migrates landward (Donnelly et al. 2006). For these reasons natural barrier island processes, such as inlet migration and overwash that are allowed to continue in Alternatives #1 and #2 will have positive impacts on habitat and wildlife.

**Response: This information has been incorporated into Section 5.3.2.2 of the FEIS.**

6. The DEIS does not address negative impacts to shorebirds, including piping plovers, colonial waterbirds and other coastal fauna, associated with maintaining an inlet in a fixed position. The DEIS needs to discuss the implications of maintaining an inlet in a fixed position. Inlet and shoreline stabilization are listed as factors affecting plover survival and utilization of wintering habitat and breeding habitat (USFWS 1996). Under cumulative impacts to "inlets dunes and beaches" the DEIS concludes "Without repositioning the New River Inlet to a more perpendicular position, the dunes within the Inlet complex of the Permit Area may be susceptible to erosion. The loss of dune habitat in the Inlet complex would threaten dune vegetation, as well as degrading the habitat used by several species of roosting foraging and nesting shorebirds." Waterbirds are adapted to the dynamic nature of inlets and barrier islands. Inlet migration actually creates the bare, sandy habitat needed by most species of shorebirds and other waterbirds. The DEIS should have statements under the appropriate alternatives about the positive effects of a migrating inlet on the natural resources.

**Response: New River Inlet has not experience any substantial wholesale migration or gross change in position over the last 50 years. For the most part,**

the inlet fluctuates north and south within a fairly small corridor. The major impacts the inlet has on the adjacent shorelines is associated with the instability of the ocean bar channel which tends to go through cycles with the channel migrating from a southwesterly alignment to one with a more southeasterly component. These shifts in the inlet channel produce episodes in which ocean bar sediments migrate on shore as the ocean bar channel migrates and abandons previous portions of the ebb tide delta. Simply maintaining the channel within a preferred corridor will not directly result in major changes to the dune systems on the adjacent islands. In the absence of artificial beach nourishment, as would be the case for Onslow Beach, the south end of the island will continue to experience frequent episodes of overwash.

7. The discussion of the alternatives should acknowledge the impacts of severe storms on the various alternatives.

**Response: The impacts of natural phenomena including storms and sea level rise are discussed within Section 5.**

8. Appendix F does not fully assess the cumulative impacts of the project.

**Response: The Cumulative Effects Assessment (Appendix F) has been updated and finalized with additional information.**

9. The mitigation section is does not fully address impacts from this project. There are several known impacts as well as several potential, unanticipated impacts that can result from this project. A loss of forage base for shorebirds during nourishment events, which lasts at least months, will occur. We also know that maintaining the channel through New River Inlet will act to stabilize the inlet. Stabilization of inlets is considered a serious threat to piping plovers because it can lead to a net loss of suitable habitat (USFWS 1996). It also negatively impacts colonial waterbird and other shorebirds as it can eliminate or reduce microhabitats needed by these birds. There will be a loss of overwash and blowout habitats on the beach front due to the maintenance of a 15 foot dune. We recommend the following environmental commitments should the preferred alternative be permitted:

- Cease beach scraping activities.
- Conduct long term habitat monitoring to look at changes near the inlet and along North Topsail and Onslow Beach. -Analyses of microhabitats and changes in salt marsh on the sound side should be included.
- Participate in research/restoration projects for benthics. These should be well designed studies that help to answer questions that remain about benthic organisms.
- Allow creation of nesting habitat on nearby dredge islands by using material dredged from Cedar Bush Cut to cover vegetation on islands (i.e. this material should go to the islands rather than N. Topsail as it has in the past since N. Topsail would be receiving sand from other sources).

-Plan and implement a management plan for waterbirds using the north end of Topsail Island.

**Response:** Section 6.4.6 provides a detailed description of Habitat Mapping, which includes monitoring of habitat changes within the inlet. Section 6.4.5 provides a description of a benthic research study. Section 6.4.1 provides information regarding the bird monitoring plan. The incompatible material dredged from the inlet will be placed on an upland disposal area in proximity to the AIWW and will provide habitat for wildlife.

10. Unanticipated changes as a result of project implementation should be addressed. For example, stabilization of the inlet could lead to increased vegetation and loss of bare sand habitat on the inlet beaches. This needs to be measured and restoration activities may be necessary in the future to create open/sandy habitats. Also, there was some discussion during PDT meetings that there could be losses of sand along the inlet shoreline and on Onslow Beach. How will these changes be addressed?

**Response:** The project would not “stabilize” the inlet as the new inlet channel is expected to shoal rather rapidly and could migrate outside its preferred corridor. The shorelines on both the Onslow Beach and North Topsail Beach sides of the inlet are expected to continue to oscillate in response to periodic build ups and break downs of the sand spit projecting into the inlet off the south end of Onslow Beach. Note that over the past 20 to 25 years, there has been very little net movement of the inlet shoreline on the North Topsail Beach side of the inlet while the inlet shoreline on the Onslow Beach side has experienced rapid and dramatic changes all associated with changes in the configuration of the sand spit off the south end of the island. In addition to the impacts of the oscillating sand spit, vegetation along the inlet shorelines is controlled to some extent by frequent overwash episodes that occur during storms. Maintaining the inlet’s ocean bar channel in a relatively fixed position and alignment will not impact changes associated with the Onslow Beach sand spit or changes due to storms.

11. 4.1 (p. 47, figure 8a) - Please check your analysis of acreage of the different habitats. For example, there are areas listed as "dune" that are actually "overwash." This will affect the impacts analysis in Section 5.

**Response:** The Final EIS maintains the baseline conditions of the Draft EIS in which the biotic community maps were completed in 2005 and 2006. It has been noted in Section 4 that dune communities do contain overwash flats. Furthermore, overwash habitat is understood to be an important component of the system and is cited as such in Section 5.3.2.2

12. 4.1.3 (p. 55, end of 1st paragraph) - "610 km" should be "610 m".

**Response:** This has been amended as such.

13. 4.2.3 (p. 74, 3rd paragraph) - In the description of piping plovers it is stated" ... although they may utilize other shoreline habitats (i.e. lake shores, river margins) ... " This is incorrect as written. Interior populations breed along lake shores and river margins, while the Atlantic Coast population only nests along coastal beaches.

**Response: This has been amended as such.**

14. 4.2.3 (p.74, last paragraph) - " ... adult mortality has been identified as a key determinant in population trends, while nest sites and clutch size were not found to cause early populations to decline (Burger 1987, 1991). This sentence is unclear. Please confirm this is what the authors were saying.

**Response: This has been amended as such.**

15. 4.2.3 (p. 75, 3rd paragraph) - "In 2001, the US breeding population increased 10% with 1,280 total pairs while the US Atlantic Coast population increase 13% to 1,525 ... " The total US population should be greater than the US Atlantic Coast population. Are you sure these figures don't include Canada?

**Response: This statement has been removed as the document has been updated.**

16. 4.2.3 (p. 75, 4th paragraph) - Change the last sentence to read "While plover populations have increased in NC in recent years, problems with low productivity remain, leaving the population vulnerable to ... "

**Response: This has been amended as such.**

17. 4.2.3 (p. 75, last paragraph) - The document is incorrect in the way it presents the piping plover data. It should be made clear that non-breeding piping plover data provided by NCWRC is based on just a few opportunistic sightings and not regular surveys. Breeding surveys are more complete and are conducted annually and wintering surveys are conducted every five years. Furthermore, Table 13 misrepresents the data since there is no measure of survey effort (e.g. zero entered for certain seasons when we never visited N. Topsail). It may make more sense to exclude seasons with no data or put N/A and then do a better job explaining how data was collected. Please work with the NCWRC waterbird biologist to make sure data is accurately displayed.

**Response: This confusion has been rectified by qualifying statements within Section 4.2.3.**

18. 4.2.3 (p. 77) - Table 14 misrepresents the data. Data from different days is not necessarily additive (e.g. may be seeing the same birds on different days). We recommend either using a peak count or clearly indicating that this data reflects the

number of observations and not the number of birds. Please work with NCWRC waterbird biologist to make sure this data is accurately displayed.

**Response: This confusion has been rectified by qualifying statements within Section 4.2.3.**

19. 4.2.3 (p. 78) - Table 15 misrepresents the data. Please work with NCWRC waterbird biologist to make sure this data is accurately displayed.

**Response: This confusion has been rectified by qualifying statements within Section 4.2.3.**

20. 4.2.3 (p. 79) - The third sentence should be changed to read "The *breeding* status of this species in Onslow County ... "

**Response: This has been addressed.**

21. 4.2.3 (p. 77-80) - In discussions of the various listings/rankings for species of waterbirds, it should be noted that while many of discussed species may be considered globally secure, they are listed as species of high conservation concern on a regional and/or continental scale. Common terns are undergoing significant declines in the southeast and so are listed as a species of regional concern (Hunter et al. 2006). Gull-billed terns, least terns and black skimmers are listed as species of high conservation concern for North America (Kushlan et al. 2002). Wilson's plovers and American oystercatchers are listed nationally as species of high conservation concern (Brown et al. 2001).

**Response: This has been addressed.**

22. 4.2.3 (p. 80) - The first sentence under American Oystercatchers should read "American oystercatchers are listed nationally as a species of high conservation concern (Brown et al. 2001)." Also, in this section referring to the NCWRC data, it is important to note that 2004 is the first year that we did a complete coastwide survey. So data is complete just for this year. The next complete survey was done in 2007.

**Response: his has been addressed.**

23. 4.2.3 (p. 81) - Third sentence should read" ... and more specifically, within the permit area in maritime shrub/scrub habitat on North Topsail Beach, Onslow Beach and New River Inlet islands."

**Response: This has been addressed.**

24. 4.3.1.1 (p.87) - Much of the section on bird use of salt marshes isn't relevant (i.e. doesn't relate to bird use of salt marsh). A paragraph that simply lists some of the

coastal birds that use marsh habitat (e.g. rails, wading birds, terns, skimmers, shorebirds, waterfowl) and an explanation of why this habitat is important (e.g. very productive, abundant forage) would suffice. As written now, this section is very confusing because it frequently refers to bird activities in other habitat types.

**Response: This has been addressed.**

25. 4.3.2 (p. 102) - Much of the section on bird use of inlet complexes isn't relevant and it contains little information on benefits of this habitat to coastal birds. The important point to get across in this section is that inlet complexes are invaluable to coastal birds. This habitat is used by colonial waterbirds, shorebirds and other waterbirds for breeding, migration and wintering and many of the species that rely on these habitats are declining. These birds rely on the dynamic nature of inlets to provide the habitat and resources they need.

**Response: This has been addressed.**

26. 4.3.2 (p. 103, 1st paragraph) - Should read "To complete these flights, shorebirds must obtain large *fat* reserves."

**Response: This has been addressed.**

27. 4.3.2 (p. 103, last paragraph) - "Currently the greatest reason for the decline of shorebird populations is loss of wetland habitat and lack of primary food resources ... " This statement is incorrect. Change to read "Many shorebird species face significant threats from habitat loss, human disturbance and from different forms of habitat degradations such as pollution, prey resource depletion, and increasing threats from predators (Brown et al. 2001)."

**Response: This has been addressed.**

28. 4.3.2 (p. 104/105) - The last paragraph is very confusing. It primarily discusses royal and sandwich terns in some detail, yet these species are not found nesting near New River Inlet. Which species are declining?

**Response: This paragraph has been updated to rectify confusion.**

29. 4.3.2 (p. 105) - The discussion of "other waterbirds" has several inaccuracies. For example, this section lists three species and then indicates that they are mostly found during migration and winter, but two of the three species nest in vicinity of New River Inlet.

**Response: This discussion has been updated to rectify confusion.**

30. 4.3.2 (p. 105, 5<sup>th</sup> paragraph) - This paragraph appears to be incomplete. The importance of inlet complexes to breeding shorebirds has not been discussed and



should be mentioned at the beginning of this section when discussing shorebirds. Shorebirds that utilize inlet complexes for breeding in NC are piping plovers, Wilson's plovers, American oystercatchers and willets.

**Response: This discussion has been updated to rectify confusion.**

31. 4.3.2.2 (p. 108) - We're pleased to see the inclusion of overwash habitats in the description of inlet complexes. It should be noted that this habitat is important on ocean facing beaches as well.

**Response: Noted.**

32. 4.3.2.2 (p. 109) - In the first sentence under "benefits for birds", include terns and skimmers in the list of birds that nest in open areas. The last sentence of this same paragraph should read " ... breeding and nonbreeding colonial waterbirds and shorebirds." As written now, piping plovers are incorrectly listed as a colonial waterbird.

**Response: This has been addressed.**

33. 4.3.2.2 (p.110) - The mentioned IBA is Onslow Bay not Onslow Beach.

**Response: This has been addressed.**

34. 4.3.3.3 (p.111) - This section displays post project benthic data from the Bogue Inlet project. Is there any pre project data for comparison?

**Response: This has been addressed.**

35. 4.3.3.3 (p.118) - The last paragraph does not accurately characterize the findings of Peterson et al. 2006. The authors conclude that " ... despite adaptations to this dynamic environment, the high intensity, large scope and poor coarse shell material of the Bogue Banks project resulted in a perturbation that exceeded biotic resistance and degraded the trophic transfer function of the habitat for at least one warm season." While *Emeritus* recovered relatively rapidly as you mentioned, *Donax* and amphipods failed to even initiate recovery in the year following the project.

**Response: This has been addressed in Section 4.3.3.3.**

36. Section 5 (p. 143) - The DEIS notes that several habitat types (estuarine, intertidal shoal, low marsh and subtidal) were not included in Table 20 because they will not be affected. Some of these habitats will be directly impacted (e.g. new channel goes directly through an existing intertidal shoal, beach fill will impact subtidal habitat) and they should be considered.

**Response: Although these habitats are not included in Table 20, Section 5 includes lengthy discussion pertaining to the environmental consequences of**

**these habitats and a summary of environmental impacts to resources is presented in Table 21.**

37. Section 5 (p. 144) - We disagree with the analysis in Table 20. This is an overly simplistic approach to looking at habitat changes as it only considers erosion rates and does not take into account other natural processes such as barrier island migration.

**Response: A comprehensive discussion regarding environmental impacts is depicted throughout Section. Table 21 provides a brief summary of the impacts associated with each alternative and resource.**

38. Appendix F (p. 19) - We disagree with assessment of shorebird resources under "cause/effect relationship." This section concludes that the project will enhance foraging for shorebirds in the short term and enhance nesting habitat in the long term. While it's true that the project may enhance foraging in the short term because of the availability of dead benthic invertebrates during project construction, it can negatively impact foraging in the long term. First, invert populations will be depressed for some time after project completion and likely during at least one season of peak spring and fall shorebird migration, when forage resources are needed most. Second, the project could have cumulative impacts from multiple events. While it's true that the beach will be wider, it is unlikely that it will provide nesting habitat for birds because of the large maintained dunes and high levels of human disturbance in the absence of specific management for coastal birds. Furthermore, nesting habitat will be lost in other areas because the inlet will be stabilized, likely leading to increased vegetation and loss of open sandy areas near the inlet.

**Response: This "cause/effect relationship" has been adjusted to reflect the reviewer's comments.**

39. Appendix F (p. 23, 2nd paragraph) - 84 piping plovers were found overwintering in NC during the last coast-wide winter census conducted in 2006. The document indicates eleven plovers winter in NC.

**Response: This statement has been rectified in the Final CEA.**

40. Appendix F (p. 23, last paragraph) - Gull-billed terns have been observed in Onslow County recently found breeding in 1988 and observed more recently during the non-breeding season.

**Response: This statement has been rectified in the Final CEA.**